

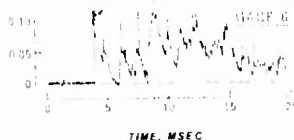
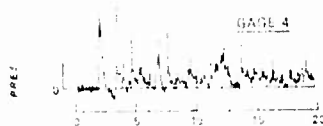


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TECHNICAL REPORT SL-84-22

# AIRBLAST ATTENUATION IN ENTRANCEWAYS AND OTHER TYPICAL COMPONENTS OF STRUCTURES

SMALL-SCALE TESTS DATA REPORT 1

by

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Waterways Experiment Station, Corps of Engineers  
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December 1984

Interim Report  
(July 1981-April 1982)

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entrance of tunnels of circular and square cross sections. The model structures were about 30 cm in diameter and from 4 to 24 tunnel diameters long. Both end-on and side-on burst configurations were used. Blast pressure was measured at locations ranging from 1/6 to 24 diameters from the entrance. Included in the program were tests of blast propagation in a long straight tunnel, blast reflection at the end of short tunnels, blast attenuation in side tunnels and "T" tunnels, blast propagation in 45 and 90 degree bends and blast suppression with a vented expansion chamber.

Pressure-time histories with corresponding impulse-time histories and tabulated peak values are presented.

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## PREFACE

This investigation was sponsored jointly by the Office, Chief of Engineers (OCE), U. S. Army, and by the Air Force Engineering and Services Center, Tyndall AFB, U. S. Air Force. The work was performed under OCE R&D Project 4A161102AT22, Task area B0, Work Unit 003.

The investigation was conducted during the periods July 1981 and January to April 1982 by personnel of the Structures Laboratory (SL), U. S. Army Engineer Waterways Experiment Station (WES), Vicksburg, MS. The field tests were conducted by J. R. Britt, R. Walters, S. B. Price, and D. Hale of the Explosion Effects Division (EED).

L. T. Watson and L. Sadler of the WES Instrumentation Services Division (ISD) provided field instrumentation support and instrument calibration, respectively.

Data processing was performed by J. T. Brogan and D. W. McAlpin, EED.

The investigation was under the general supervision of J. W. Brown, Chief, EED, and B. Mather, Chief, SL. COL Tilford C. Creel, CE, was Commander and Director and F. R. Brown was Technical Director of WES during the investigation.

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CONVERSION FACTORS, METRIC (SI) TO U. S. CUSTOMARY  
UNITS OF MEASUREMENT

Metric (SI) units of measurement used in this report can be converted to  
U. S. customary units as follows:

<u>Multipli</u>	<u>By</u>	<u>To Obtain</u>
Centimetres	0.3937	inches
Kilograms	2.205	pounds (mass)
Metres	3.281	feet
Metres per second	3.281	feet per second
Pascals	0.000145	pounds (force) per square inch

AIRBLAST ATTENUATION IN ENTRANCEWAYS  
AND OTHER TYPICAL COMPONENTS OF STRUCTURES:  
SMALL-SCALE TESTS DATA REPORT 1

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Many permanent shelters and field fortifications have openings into which airblast from near-miss conventional warhead explosions may propagate to produce damage and injury to the interior. A large amount of research has been conducted for long duration pulses simulating nuclear detonations (Reference 1). But before this test program only a small amount of information was available for high pressure, extremely short duration pulses produced by conventional weapons. Experimental data in this area are limited to a few shock tube tests (Reference 2), and limited small-scale high explosive tests (References 3 and 4). Important differences between these results and the nuclear blast simulations have been noted, and calculational techniques developed for the long duration pulses have often had poor success in predicting the attenuation of high pressure, short durations pulses.

This investigation was designed to obtain information needed to determine fundamental characteristics of short duration shock penetration into structures through openings.

1.2 OBJECTIVE

The objective of this investigation was to develop an experimental data base for the airblast produced by conventional high explosive

detonations which intrudes into structures through air entrainment systems, doors and other openings. This information will provide an experimental basis for the development of airblast prediction methods for the selection of blast doors and blast valves and the design of the geometrical configuration of personnel and air entrainment entranceways to suppress blast.

The objective of this report is to present the experimental data obtained in the small-scale explosive test program. The analysis of the measurements will be given in later reports.

This report describes the first phase of the experimental effort consisting of a comprehensive small-scale explosive test program conducted in the summer of 1981 and the winter of 1982.

### 1.3 SCOPE

The experimental program consisted of a series of spherical charges ranging from 113 to 907 g of composition C-4 explosive detonated outside and inside the entrance of tunnels of circular and square cross-sections. The model structures were about 30 cm in diameter and from 4 to 24 tunnel diameters long. Both end-on and side-on burst configurations were used. Blast pressure was measured at locations ranging from 1/6 to 24 diameters from the entrance. Included in the program were tests of blast propagation in a long straight tunnel, blast reflection at the end of short tunnels, blast attenuation in side tunnels and "T" tunnels, blast propagation in 45 and 90 degree bends and blast suppression with a vented expansion chamber.

The test structures were fabricated from steel plate and heavy

*Fig. 1. Test structure without flow meter*  
*Fig. 2. Test structure with flow meter*  
7

wall (0.95 cm thickness) steel tubing of both round and square cross-sections. Pressure transducers were mounted from the outside of the tunnel so that the sensing surface was flush with the inside wall to obtain side-on blast measurements. Gages were also located facing the blast on the plate surrounding the entrance.

The tests were performed at the Waterways Experiment Station Big Black Test Site near Vicksburg, MS.



## CHAPTER 2

### INSTRUMENTATION AND DATA PROCESSING

#### 2.1 GAGES

Airblast overpressures for the 1981 series of tests were measured with Kulite HKS-375 pressure sensors in ranges from 3.45 to 68.9 MPa (500 to 10,000 psi), having natural frequencies from 350 to 750 kHz, respectively. PCB Piezotronics, Inc. Series 102 gages were also used at locations 2, 15, 19, 23, 32, 33, and 35 of the long straight tunnel but no usable records were obtained due to instrumentation problems. The transducers were mounted flush with the inside walls of the tunnel and the front of the entrance plate.

The measurements for the 1982 series of tests were made with Kulite HKS-375 pressure transducers with identical ranges and natural frequencies as those used in the 1981 series. In addition, Kulite XT-190 transducers with ranges from 0.689 to 1.38 MPa (100 to 200 psi) and natural frequencies from 160 to 200 kHz, respectively, were used.

Excessive noise caused by waves traveling down the tunnel wall was encountered during the 1981 series. In order to insulate the transducers used in the 1982 series from this vibration, specially designed gage mounts shown in Figures 2.1 through 2.3 were used. Initially, mounts fabricated from aluminum and nylon were used. After several shots it was observed that these mounts were not providing the desired gage isolation. To further cushion the transducers, a thin layer of RTV silicon rubber or biwax was used between the nylon insert and the outer aluminum housing in several mounts. These mounts were installed for

trial use in Shots 24 through 36. Gage 14 in these shots was mounted in the RTV lined mount, while gages 11 and 13 in Shots 26 through 36 were mounted in the biwax lined mounts. The RTV provided excellent damping of the vibrations but was rather weak. The biwax proved to be no improvement over the solid nylon insert. Based on these results, the RTV mount was used whenever possible in the remaining tests, except in locations near the tunnel entrance, where the stronger nylon-aluminum mounts were used.

The gages were connected to the recording system using small 4 conductor shielded cable approximately 40 meters (130 ft) in length.

## 2.2 RECORDING SYSTEM

The analog signals for the 1981 series were recorded using Sangamo Sabre IV 32-track FM magnetic tape recorders with a flat frequency response from dc to 40 kHz. A Sangamo Sabre V 32-track FM wide band Group I magnetic tape recorder with a flat frequency response from dc to 80 kHz was used during the 1982 series. WES developed amplifiers compensated for flat frequency response to 80 kHz were used during both series.

## 2.3 DATA PROCESSING

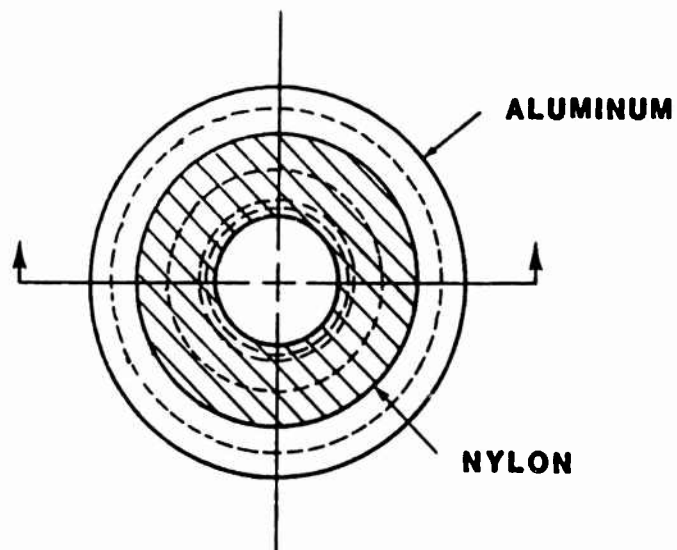
All data were reduced to digital format on the WES analog-to-digital converter and processed on the WES computer. Processing included baseline correction, filtering, and integration routines.

2.3.1. Digitizing. The analog data signals were converted to digital format using the WES high-speed analog-to-digital converter. Gages 1 thru 20 and 31 thru 38 of the 1981 series were digitized at a

rate of 500 kHz, while Gages 21 thru 30 were digitized at 200 kHz. All data from the 1982 series were digitized at 500 kHz.

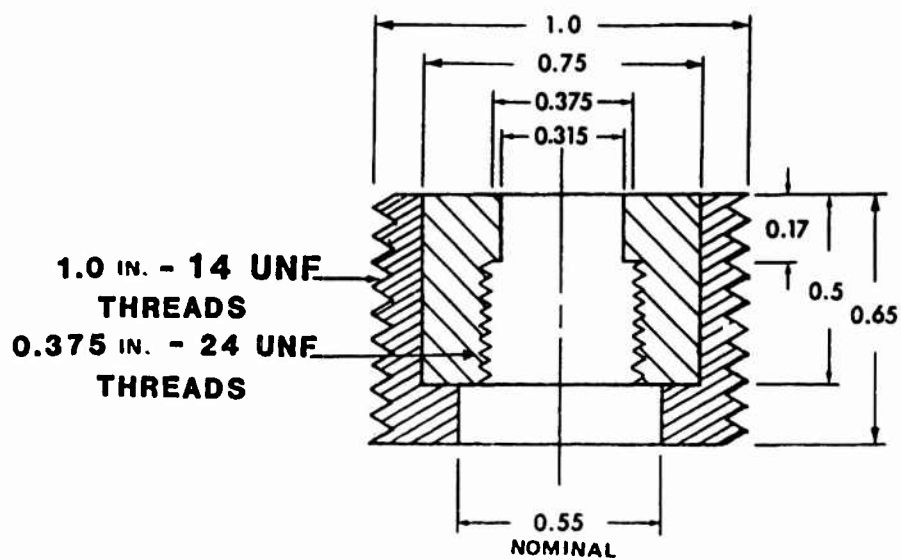
2.3.2 Filtering. Digital filtering routines were used when necessary to reduce background noise in the data signal. Filter information, when present, is listed below the shot and gage identification for each record. Generally, low-pass filters were used. Various sampling frequencies were required in conjunction with the filters to obtain the desired low-pass band. Details of the filters are given in Reference 5.

2.3.3 Baseline Correction. Baseline corrections were applied when necessary to produce zero impulse at the arrival of the shock wave front.



**TOP VIEW**

**ALL DIMENSIONS  
IN INCHES**



**FRONT VIEW**

Figure 2.1 Nylon-aluminum gage mount.

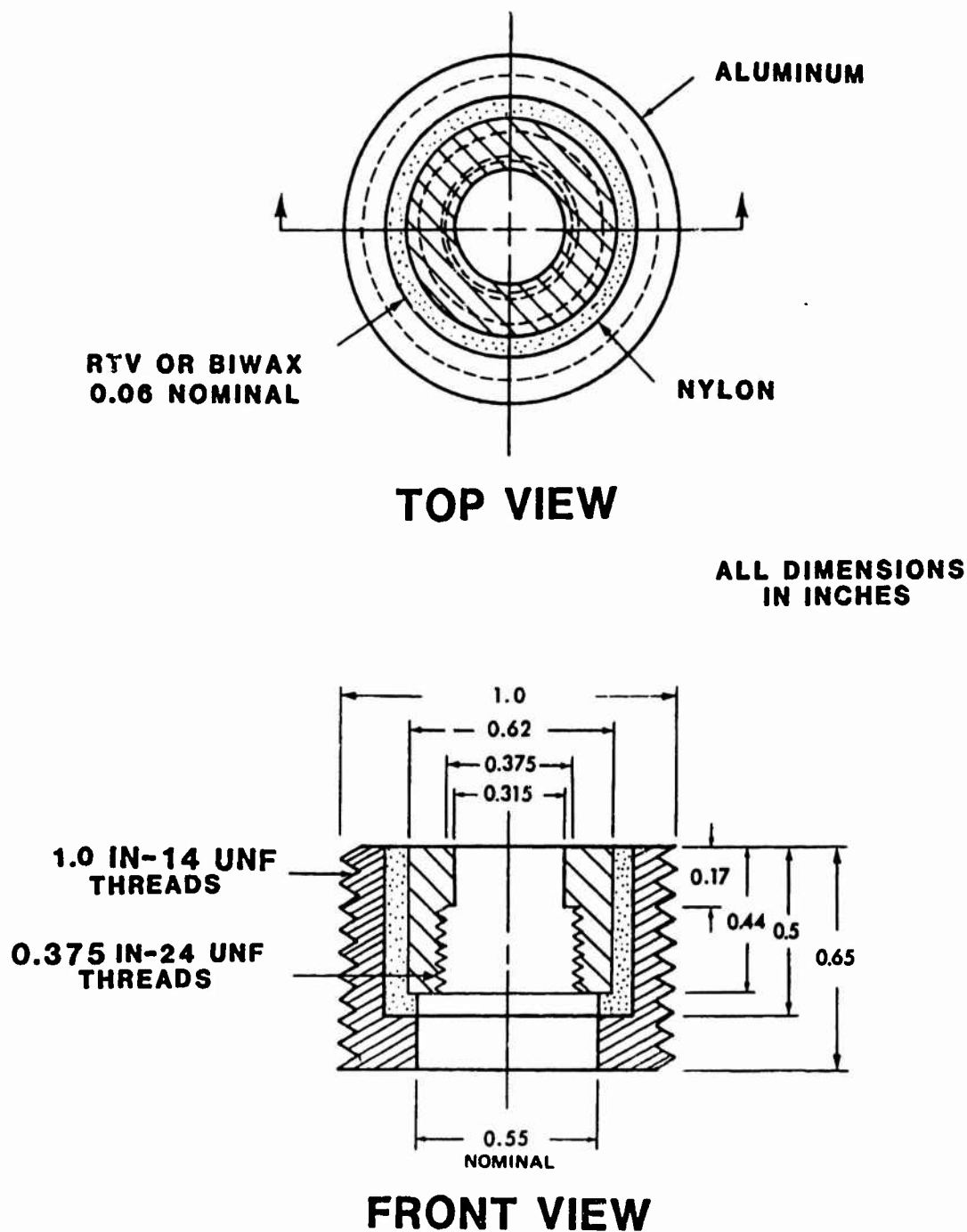
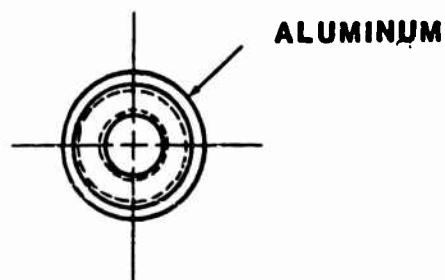
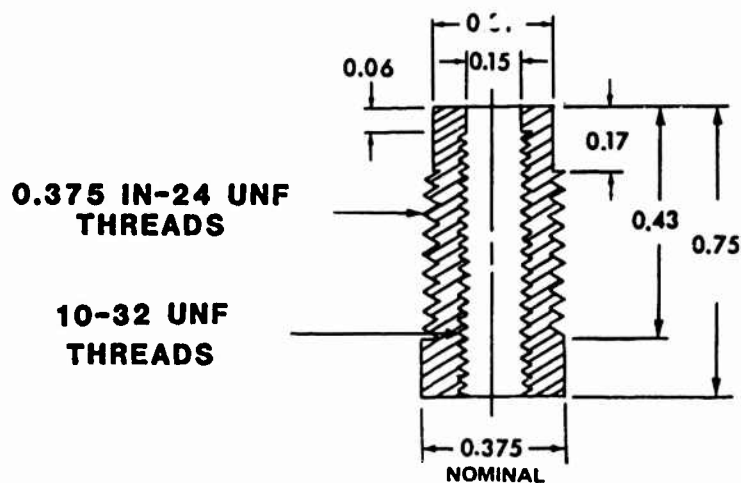


Figure 2.2 Gage mounts with RTV or Biwax.



## TOP VIEW

ALL DIMENSIONS  
IN INCHES



## FRONT VIEW

Figure 2.3 Adapter for XT-190 transducers.

## CHAPTER 3

### TEST DESCRIPTION

#### 3.1 STRUCTURE DESCRIPTION

The 1981 series of tests used the 24 ft (7.32 m) long straight tunnel shown in Figure 3.1. Figure 3.2 represents the general dimensions of the structure, and Table 3.1 lists the gage positions with respect to both radial orientation and distance from the tunnel entrance. A total of 38 gages were installed in the long straight tunnel, with Gages 1 thru 30 located inside along the length of the tunnel and 31 thru 38 located on the face of the entrance plate.

In the 1982 series the long straight tunnel, short straight tunnel, side tunnel, "T" tunnel, 90° and 45° bend, and vented expansion chamber configurations were used.

The 1982 long straight tunnel was the same structure used in the 1981 series, with fewer gages. Structure dimensions and gage positions are shown in Figure 3.2. Tests were conducted with the tunnel entrance both open (Shots 1-8 and 32-36) and baffled (Shots 9-31). The baffles (shown in Figures 3.3-3.5) consisted of an 1/2 inch thick steel plate and a 3 inch thick steel-plywood laminated plate, both vented with 9 holes, and an 1/2 inch thick steel plate with 36 holes. These baffles were placed over the entrance of the long straight tunnel to reduce the blast entering the structure. In Shots 24 through 31, a 30.48 cm x 30.48 cm x 30.48 cm (1 ft x 1 ft x 1 ft) steel-plywood box shown in Figures 3.6-3.8 modeling an air intake structure was placed over the entrance. The box was vented by 9 holes on every side except one. The

bottom of the box placed over the tunnel entrance was open.

The short straight tunnel dimensions and gage positions are shown in Figures 3.9-3.11. Both round and square cross-sections shown in Figure 3.12 were used.

The side tunnel and "T" tunnel configurations and gage positions are shown in Figures 3.13-3.20. Both round and square cross-sections were used.

All structure dimensions shown for each configuration are inside dimensions unless otherwise stated. Gage positions that are referenced to Point P in the illustrations are measured along the axis of the component, not from Point P to the gage position directly.

The  $90^\circ$  and  $45^\circ$  bend tunnels were constructed with square cross-sectional components only. Figures 3.21-3.24 illustrate the dimensions and gage positions of the tunnels.

The vented expansion chamber configuration consisted of a square cross-sectional tunnel leading into a 1.2 m x 1.2 m x 1.2 m (4 ft x 4 ft x 4 ft) expansion chamber, and a square tunnel exiting from one side of the chamber. Each of the components was instrumented. Overall dimensions and gage positions are shown in Figures 3.25-3.27.

### 3.2 SHOT PARAMETERS

Composition C-4, a military high explosive, was used for all tests. Most charges were detonated in an end-on position in front of the entrance. Side-on burst configurations were also used. Figure 3.28 illustrates the notation used to describe the charge location. Explosive weight and charge location for each test is shown in Tables 3.2 and 3.3.



Other information such as shot date, time and air temperature are listed in Table 3.4.

Table 3.1. Airblast Penetration  
1981 Gage Locations

Gage No.	Angle (Degrees)	Distance From Face	
		(cm)	(in.)
Gages Located Inside Tunnel			
1	180	5.08	2.0
2	0	5.08	2.0
3	90	5.08	2.0
4	270	5.08	2.0
5	180	10.16	4.0
6	0	10.16	4.0
7	90	10.16	4.0
8	270	10.16	4.0
9	180	20.32	8.0
10	0	20.32	8.0
11	90	20.32	8.0
12	270	20.32	8.0
13	180	40.64	16.0
14	0	40.64	16.0
15	90	40.64	16.0
16	270	40.64	16.0
17	180	81.28	32.0
18	0	81.28	32.0
19	90	81.28	32.0
20	270	81.28	32.0
21	180	162.56	64.0
22	0	162.56	64.0
23	90	162.56	64.0
24	270	162.56	64.0
25	180	325.12	128.0
26	0	325.12	128.0
27	180	457.20	180.0
28	0	457.20	180.0
29	180	670.56	264.0
30	Center of End Cap	731.52	288.0
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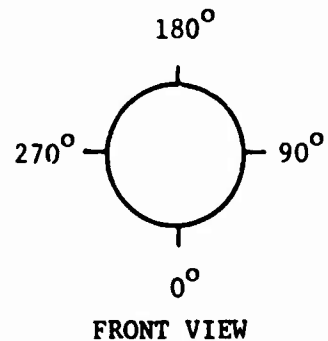


Table 3.1 (Concluded)

<u>Gage</u> <u>No.</u>	<u>Angle</u> <u>(Degrees)</u>	<u>Distance From</u> <u>Center of Tunnel</u>	
		<u>(cm)</u>	<u>(in.)</u>
<u>Gages Located on Entrance Plate</u>			
31	180	18.42	7.25
32	0	18.42	7.25
33	90	18.42	7.25
34	270	18.42	7.25
35	45	20.32	8.0
36	45	25.00	10.0
37	45	35.56	14.00
38	45	55.88	22.00

Table 3.2 Airblast Penetration Test Configurations (1981)

Charge Weight (gm) = 340.2

Shot Number	Nominal Entrance Pressure (MPa)	Charge Location	
1	3.45	Side-On	$d = 0.610 \text{ m}$ , $r = 0.041 \text{ m}$ , $h = 0$
2	1.38	End-On	$r = 0.634 \text{ m}$
3	3.45	Side-On	$d = 0.610 \text{ m}$ , $r = 0.041 \text{ m}$ , $h = 0$
4	0.689	End-On	$r = 0.875 \text{ m}$
5	0.689	Side-On	$d = 0.89 \text{ m}$ , $r = 0.305 \text{ m}$ , $h = 0.668 \text{ m}$
6	1.38	Side-On	$d = 0.658 \text{ m}$ , $r = 0.305 \text{ m}$ , $h = 0.494 \text{ m}$
7	0.345	End-On	$r = 1.189 \text{ m}$
8	3.45	Side-On	$d = 0.468 \text{ m}$ , $r = 0.152 \text{ m}$ , $h = 0.351 \text{ m}$
9	6.89	Side-On	$d = 0.295 \text{ m}$ , $r = 0.152 \text{ m}$ , $h = 0.221 \text{ m}$
10	3.45	End-On	$r = 0.402 \text{ m}$

Table 3.3. Airblast Penetration Test Configuration (1982)

Shot Number	Charge Weight gm	Nominal Entrance Pressure MPa	Charge		Pressure Gage Locations
				Location	
LONG TUNNEL 7.32m (24 ft) LONG, 0.3048m (1.0 ft) I.D.					
1	340.2	3.45	End-on r = 0.402m	1-14	
2	113.4	3.45	End-on r = 0.280m	1-14	
3	907.2	3.45	End-on r = 0.558m	1-14	
4	340.2	10.3	Side-on d = 0.193m, r = 0.152m	1-14	
5	113.4	6.89	End-on r = 0.186m	1-14	
6	340.2	6.89	End-on r = 0.268m	1-14	
7	113.4	13.8	End-on r = 0.116m	1-14	
8	340.2	13.8	End-on r = 0.165m	1-14	
LONG TUNNEL WITH 9-HOLE 0.5 INCH (1.27 cm) STEEL BAFFLE					
9	113.4	1.38	End-on r = 0.439m	1-13	
10	340.2	1.38	End-on r = 0.634m	1-13	
11	340.2	6.89	Side-on d = 0.369m, r = 0.152m	1-13	
12	340.2	3.45	End-on r = 0.402m	1-13	
13	340.2	6.89	End-on r = 0.268m	1-13	
14	340.2	13.8	End-on r = 0.165m	1-13	
LONG TUNNEL WITH 9-HOLE 3 INCH (7.62 cm) THICK STEEL AND WOOD BAFFLE					
15	340.2	3.45	End-on r = 0.402m*	1-13	
16	340.2	6.89	End-on r = 0.268m*	1-13	
17	340.2	13.8	End-on r = 0.165m*	1-13	
18	340.2	6.89	Side-on d = 0.369m, r = 0.152m	1-13	

\* Measured from 6 ft x 6 ft (1.83m x 1.83m) steel plate.

Table 3.3. (Continued)

Shot Number	Charge Weight gm	Nominal Entrance Pressure MPa	Charge Location	Pressure Gage Locations
LONG TUNNEL WITH 36-HOLE 0.5 in (1.27 cm) THICK STEEL BAFFLE				
19	340.2	1.38	End-on r = 0.634m*	1-13
20	340.2	3.45	End-on r = 0.402m	1-13
21	340.2	6.89	End-on r = 0.268m	1-13
22	340.2	6.89	Side-on d = 0.369m, r = 0.152m	1-13
23	340.2	13.8	End-on r = 0.165m	1-13
LONG TUNNEL WITH 1 ft (.3048 m) BOX OVER ENTRANCE				
Box Side Without Holes Up				
24	340.2	1.38	r = 0.152m, d = 0.884m, h = 0.299m	1-14**
25	340.2	1.38	r = 0.152m, d = 1.100m, h = 0	1-14
26	340.2	3.45	r = 0.152m, d = 0.771m, h = 0	1-14***
27	340.2	6.89	r = 0.152m, d = 0.585m, h = 0	1-14
Box Side Without Holes Down				
28	340.2	3.45	r = 0.152m, d = 0.585m, h = 0.299m	1-14
29	340.2	6.89	r = 0.152m, d = 0.369m, h = 0.299m	1-14
30	340.2	1.38	r = 0.152m, d = 0.884m, h = 0.299m	1-14
Box Side Without Holes Up				
31	340.2	13.8	r = 0.152m, d = 0.381m, h = 0	1-14

\* Measured from 6 ft x 6 ft (1.83m x 1.83m) steel plate.

\*\* For Shots 24-36 gage 14 was located opposite gage 13 and used mount with RTV between nylon and aluminum.

\*\*\* For Shots 26-36 gages 11 and 13 were in mounts with biwax between nylon and aluminum.

Table 3.3. (Continued)

Shot Number	Charge Weight gm	Nominal Entrance Pressure MPa	Charge Location	Pressure Gage Locations
LONG TUNNEL 7.32 m (24 ft) LONG, 0.3048 m (1.0 ft) I.D.				
32	113.4	--	Half inside entrance	5-14
33	113.4	--	Just inside entrance	5-14
34	113.4	--	0.152m inside	5-14
35	340.2	--	Half inside entrance	5-14
36	340.2	--	Just inside entrance	5-14
SHORT 2.44 m (8 ft) CAPPED TUNNELS				
Structure A 0.3048 m (1.0 ft) I.D., Structure B Square Cross-section 0.286 m (11.25 in) I.D.				
37	113.4	1.38	End-on r = 0.439m	A 1-12, B 1-12
38	340.2	1.38	End-on r = 0.634m	A 1-12, B 1-12
39	340.2	3.45	End-on r = 0.402m	A 1-12, B 1-12
40	340.2	6.89	End-on r = 0.268m	A 1-12, B 1-12
41	340.2	13.8	End-on r = 0.165m	A 1-12, B 1-12
SIDE TUNNELS				
42	340.2	0.689	End-on r = 0.875m	A 1-12, B 1-11
43	340.2	2.93	End-on r = 0.439m	A 1-12, B 1-12
44	113.4	1.38	End-on r = 0.439m	A 1-12, B 1-13
45	340.2	1.38	End-on r = 0.634m	A 1-12, B 1-13
46	340.2	3.45	End-on r = 0.402m	A 1-6, 8-12, 14
47	113.4	3.45	End-on r = 0.280m	B 1-6, 8-14
48	340.2	6.89	End-on r = 0.268m	A 1-6, 8-12, 14
49	340.2	13.8	End-on r = 0.165m	B 1-6, 8-14

Table 3.3. (Concluded)

Shot Number	Charge Weight gm	Nominal Entrance Pressure kPa	Charge Location	Pressure Gage Locations
T-TUNNELS				
50	340.2	0.689	End-on r = 0.875m	A 1-14, B 1-14
51	340.2	1.38	End-on r = 0.634m	A 1-14, B 1-14
52	340.2	3.45	End-on r = 0.402m	A 1-14, B 1-14
53	340.2	6.89	End-on r = 0.268m	A 1-14, B 1-14
54	340.2	13.8	End-on r = 0.165m	A 1-14, B 1-14
90° ELL IN SQUARE CROSS-SECTION TUNNEL				
55	340.2	0.689	End-on r = 0.875m	1-12
56	340.2	1.38	End-on r = 0.634m	1-12
57	340.2	3.45	End-on r = 0.402m	1-12
58	340.2	6.48	End-on r = 0.268m	1-12
59	340.2	13.8	End-on r = 0.165m	1-12
45° BEND IN SQUARE CROSS-SECTION TUNNEL				
60	340.2	13.8	End-on r = 0.165m	1-12
61	340.2	6.89	End-on r = 0.268m	1-12
62	340.2	3.45	End-on r = 0.402m	1-12
63	340.2	1.38	End-on r = 0.634m	1-12
64	340.2	0.689	End-on r = 0.875m	1-12
VENTED EXPANSION CHAMBER				
65	340.2	0.689	End-on r = 0.875m	1-23
66	113.4	1.38	End-on r = 0.439m	1-23
67	340.2	1.38	End-on r = 0.634m	1-23
68	340.2	3.45	End-on r = 0.402m	1-23
69	340.2	6.89	End-on r = 0.268m	1-23
70	340.2	13.8	End-on r = 0.165m	1-23
71	113.4	20.7	End-on r = 0.082m	1-23



Table 3.4. Airblast Penetration - Supplemental Test Information

<u>Shot No.</u>	<u>Date</u>	<u>Time</u>	<u>Temperature (<math>^{\circ}\text{C}</math>)</u>
<u>1981 Series</u>			
1	14 Jul 81	1:44 PM	38
2	17 Jul 81	1:34 PM	37
3	20 Jul 81	2:53 PM	38
4	21 Jul 81	2:46 PM	35
5	22 Jul 81	10:24 AM	33
6	22 Jul 81	2:24 PM	38
7	23 Jul 81	12:09 PM	38
8	23 Jul 81	3:29 PM	40
9	24 Jul 81	10:44 AM	35
10	24 Jul 81	3:05 PM	39
<u>1982 Series</u>			
1	26 Jan 82	1:36 PM	9
2	28 Jan 82	11:36 AM	14
3	29 Jan 82	11:25 AM	17
4	29 Jan 82	1:14 PM	22
5	29 Jan 82	1:56 PM	22
6	1 Feb 82	1:03 PM	10
7	1 Feb 82	2:57 PM	10
8	2 Feb 82	11:13 AM	12
9	3 Feb 82	12:36 PM	7
10	3 Feb 82	1:27 PM	7
11	3 Feb 82	1:56 PM	6
12	4 Feb 82	10:32 AM	0
13	4 Feb 82	11:27 AM	0
14	4 Feb 82	12:03 PM	0
15	5 Feb 82	1:24 PM	11
16	5 Feb 82	1:54 PM	11
17	5 Feb 82	2:23 PM	11
18	5 Feb 82	2:53 PM	9
19	8 Feb 82	12:52 PM	17
20	8 Feb 82	1:31 PM	20
21	8 Feb 82	2:08 PM	21
22	8 Feb 82	2:30 PM	21
23	8 Feb 82	3:16 PM	21
24	11 Feb 82	12:37 PM	12
25	11 Feb 82	2:19 PM	14
26	16 Feb 82	1:55 PM	24
27	17 Feb 82	10:32 AM	16
28	17 Feb 82	2:01 PM	24
(Continued)			

Table 3.4 (Concluded)

<u>Shot No.</u>	<u>Date</u>	<u>Time</u>	<u>Temperature (°C)</u>
<u>1982 Series Continued</u>			
29	19 Feb 82	12:22 PM	21
30	19 Feb 82	1:17 PM	21
31	19 Feb 82	2:43 PM	21
32	23 Feb 82	10:17 AM	26
33	23 Feb 82	10:43 AM	26
34	23 Feb 82	11:43 AM	26
35	23 Feb 82	12:47 PM	29
36	24 Feb 82	12:38 PM	27
37	4 Mar 82	11:49 AM	23
38	4 Mar 82	1:29 PM	23
39	5 Mar 82	11:43 AM	13
40	5 Mar 82	1:40 PM	11
41	8 Mar 82	11:40 AM	13
42	11 Mar 82	12:21 PM	25
43	11 Mar 82	1:49 PM	25
44	12 Mar 82	10:43 AM	23
45	12 Mar 82	12:34 PM	28
46	12 Mar 82	2:23 PM	28
47	15 Mar 82	11:46 AM	29
48	16 Mar 82	9:25 AM	27
49	16 Mar 82	1:20 PM	29
50	18 Mar 82	10:19 AM	31
51	18 Mar 82	11:18 AM	31
52	18 Mar 82	12:51 PM	33
53	23 Mar 82	12:17 PM	21
54	23 Mar 82	1:19 PM	21
55	25 Mar 82	1:03 PM	27
56	25 Mar 82	1:44 PM	27
57	25 Mar 82	2:16 PM	26
58	25 Mar 82	2:53 PM	26
59	25 Mar 82	3:37 PM	22
60	26 Mar 82	10:44 AM	12
61	26 Mar 82	11:11 AM	12
62	26 Mar 82	12:48 PM	16
63	26 Mar 82	1:22 PM	16
64	26 Mar 82	2:40 PM	14
65	30 Mar 82	10:37 AM	19
66	31 Mar 82	1:55 PM	27
67	31 Mar 82	2:29 PM	25
68	31 Mar 82	3:06 PM	25
69	1 Apr 82	12:33 PM	30
70	1 Apr 82	1:11 PM	30
71	1 Apr 82	1:47 PM	30

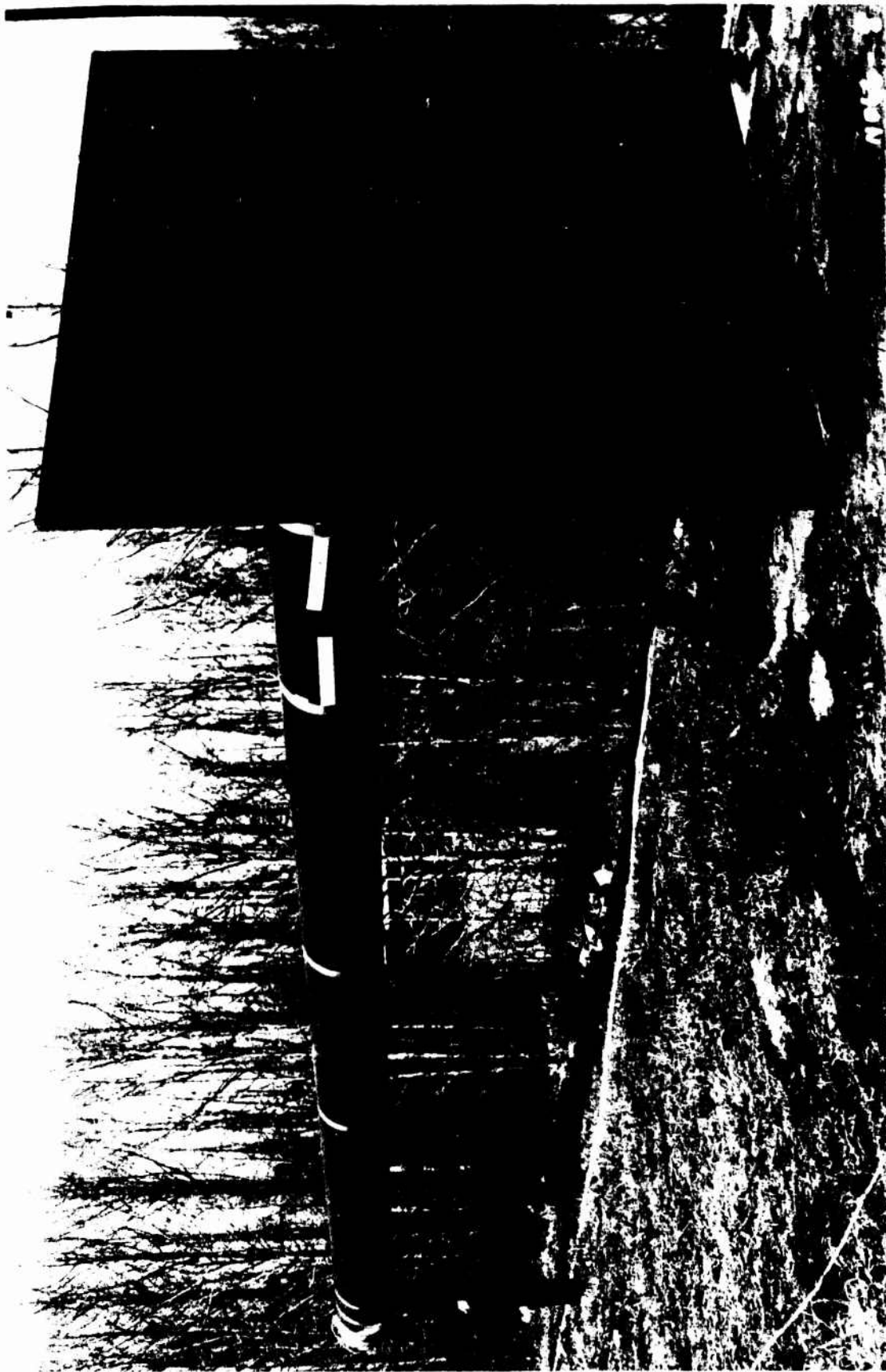
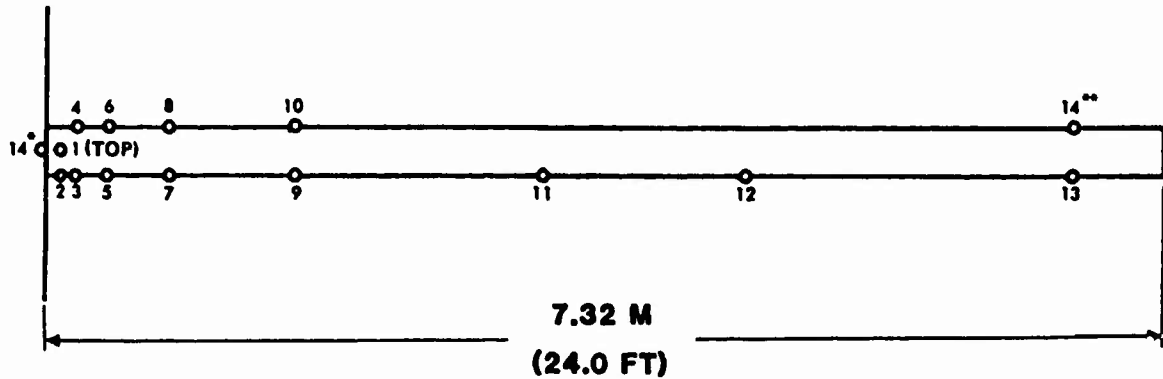


Figure 3.1 Long straight tunnel.

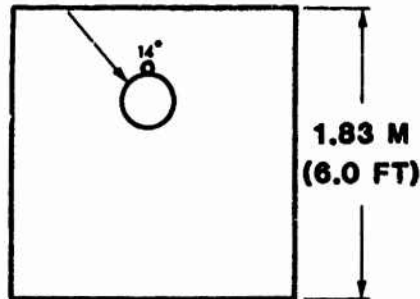
## TOP VIEW



• SHOT 1-23  
 \*\* SHOT 24-31

## FRONT VIEW

0.305 M  
 (1.0 FT) I.D.



GAGE NO.	DISTANCE FROM FACE	
	cm	(in)
1	10.16	(4.0)
2	10.16	(4.0)
3	20.32	(8.0)
4	20.32	(8.0)
5	40.64	(16.0)
6	40.64	(16.0)
7	81.28	(32.0)
8	81.28	(32.0)
9	162.56	(64.0)
10	162.56	(64.0)
11	325.12	(128.0)
12	457.20	(180.0)
13	670.56	(264.0)
14*	0.0	(0.0)
14**	670.56	(264.0)

Figure 3.2 Pressure gage arrangement in long straight tunnel, 1982 test series.



Figure 3.3 Perforated plate baffles.

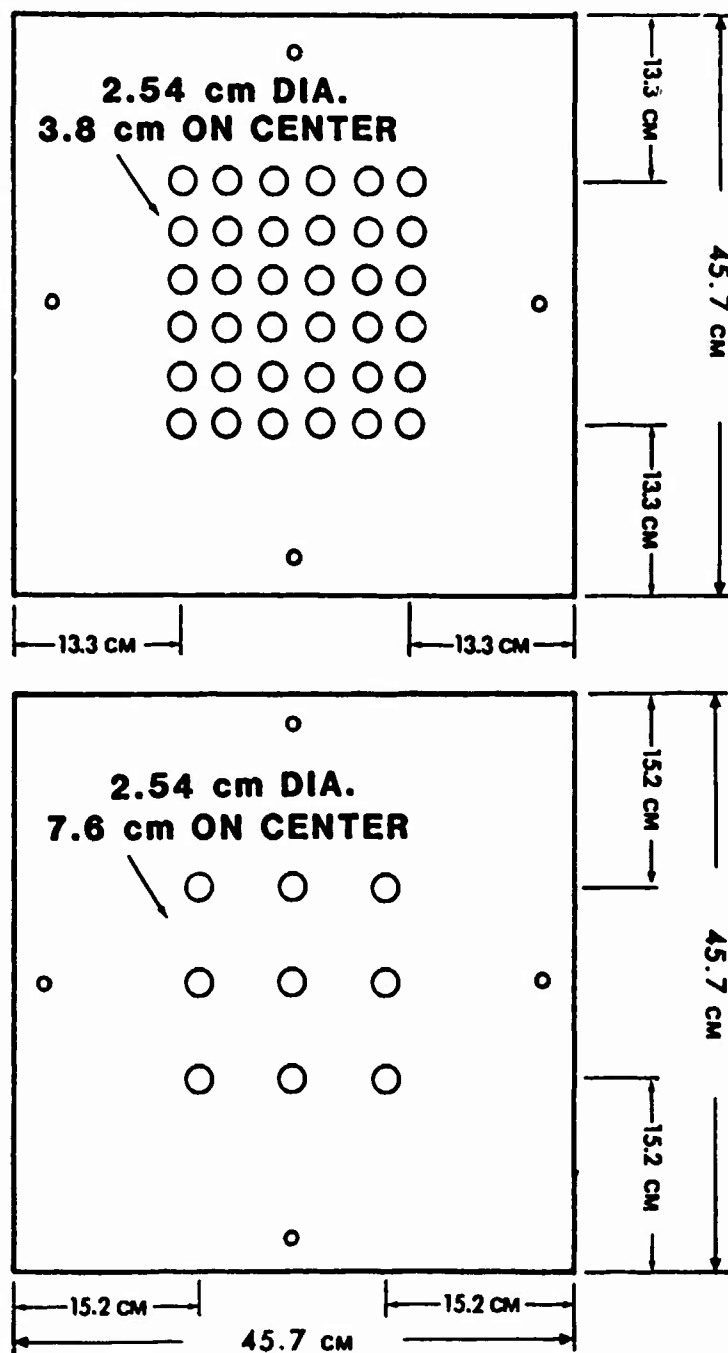


Figure 3.4 Steel baffle dimensions.

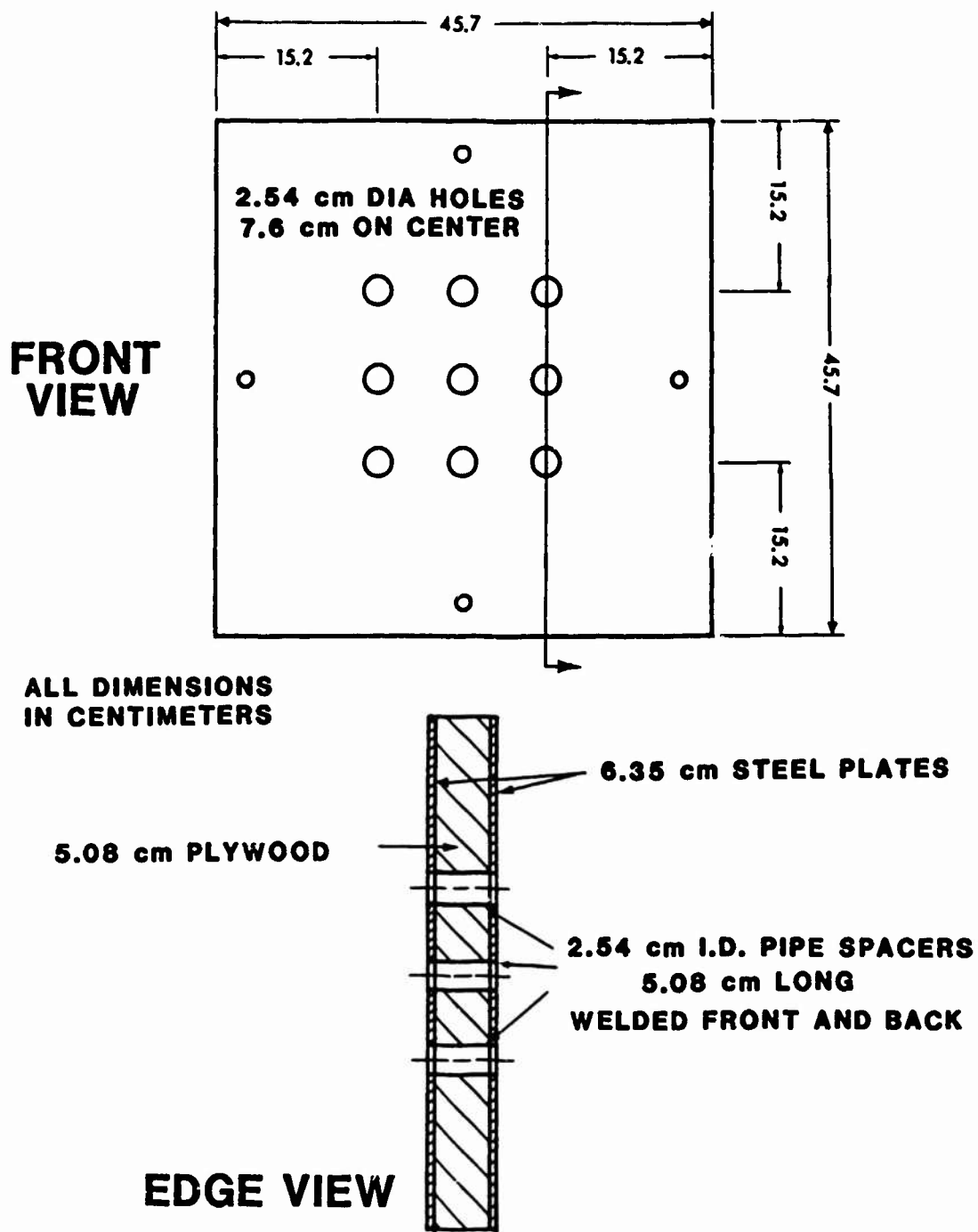


Figure 3.5 Steel-plywood laminated baffle.

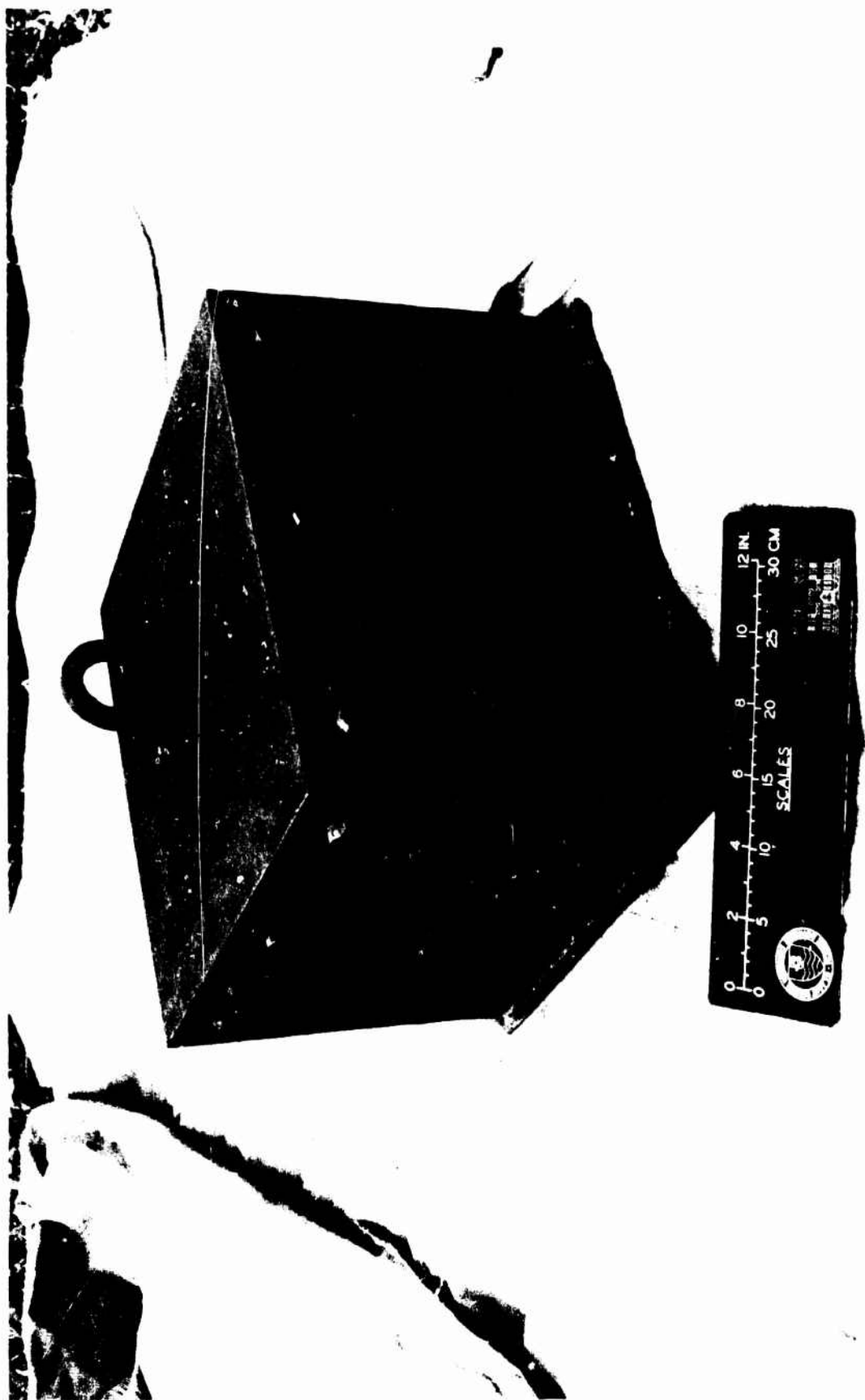


Figure 3.6 Steel-plywood model of air intake structure.

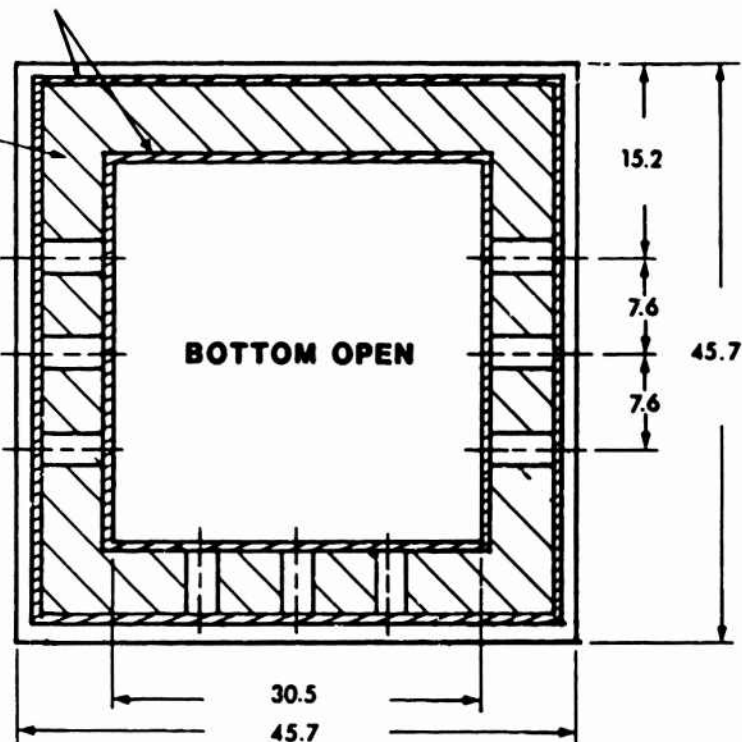




Figure 3.7 Steel-plywood model of air intake structure.

**0.64 cm STEEL PLATES**

**5.08 cm  
PLYWOOD**



**TOP VIEW**

**ALL DIMENSIONS  
IN CENTIMETERS**

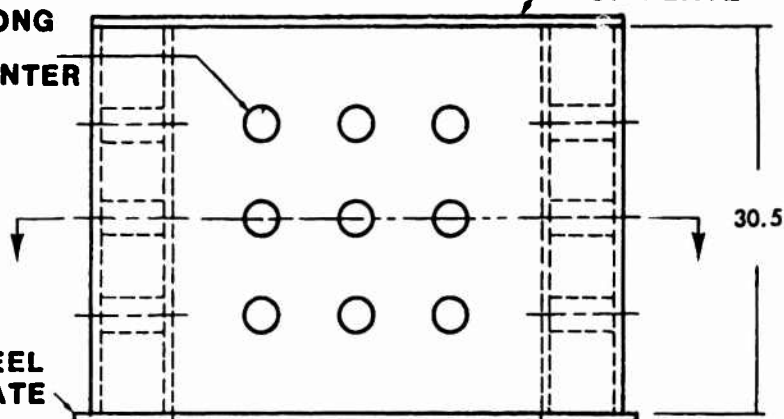
**2.54 cm I.D. PIPE SPACERS**

**5.08 cm LONG**

**7.6 cm ON CENTER**

**1.27 cm STEEL  
TOP PLATE**

**0.64 cm STEEL  
BOTTOM PLATE**



**FRONT VIEW**

Figure 3.8 Model of air intake structure.



Figure 3.9 Short Straight tunnel with round cross-section.

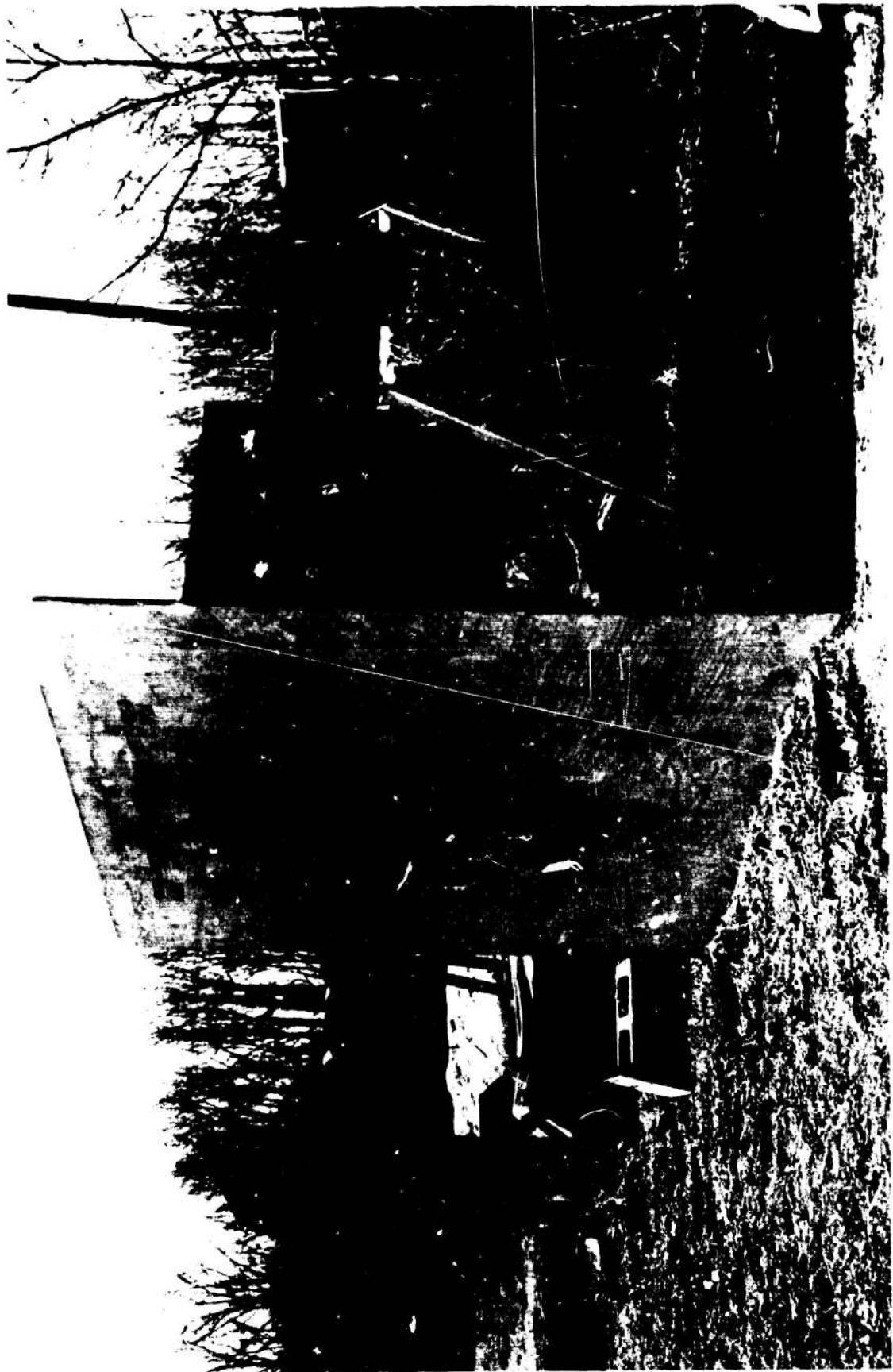


Figure 3.10 Short straight tunnel with square cross-section.

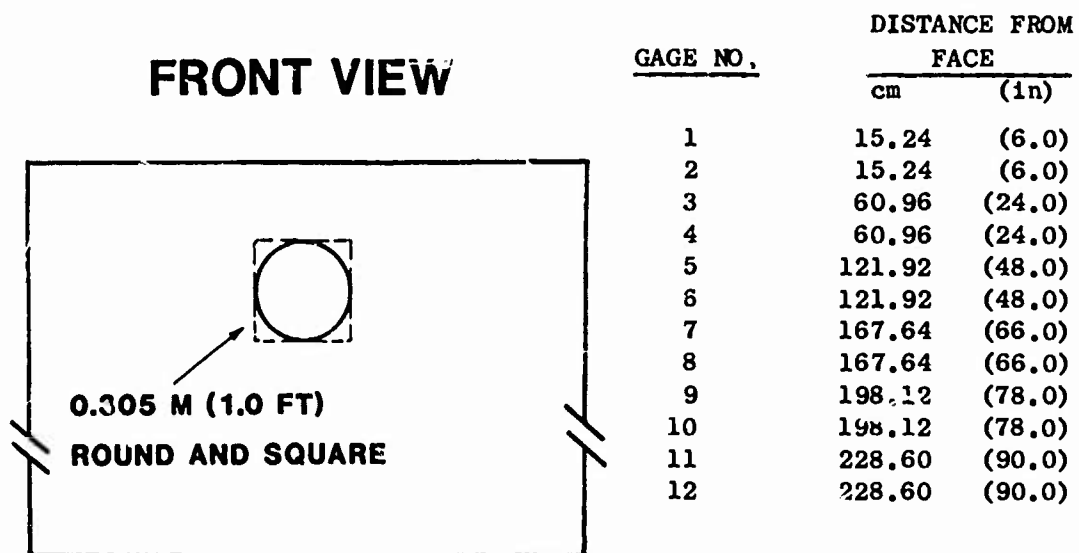
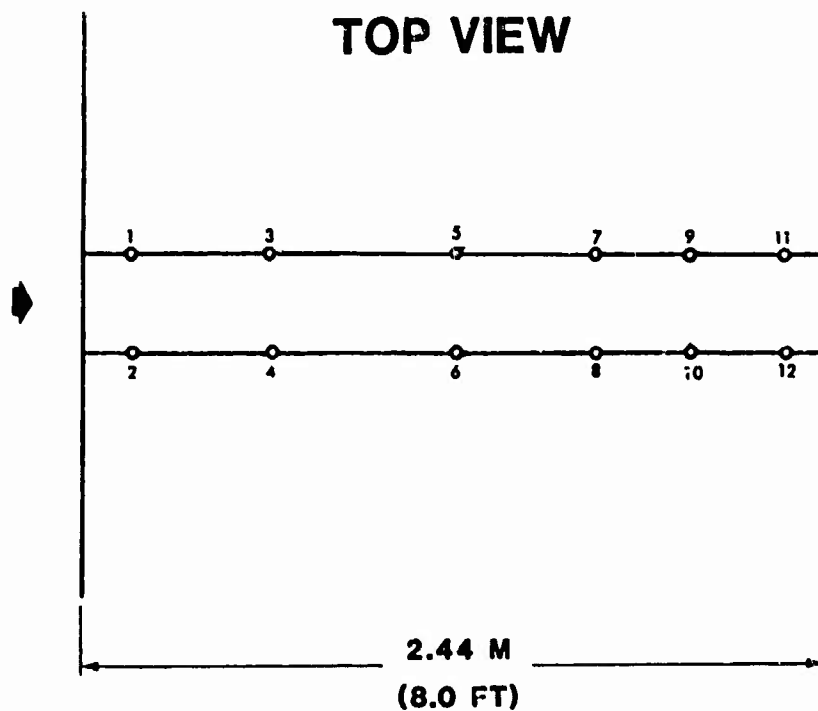


Figure 3.11 Gage arrangement for short tunnel tests.

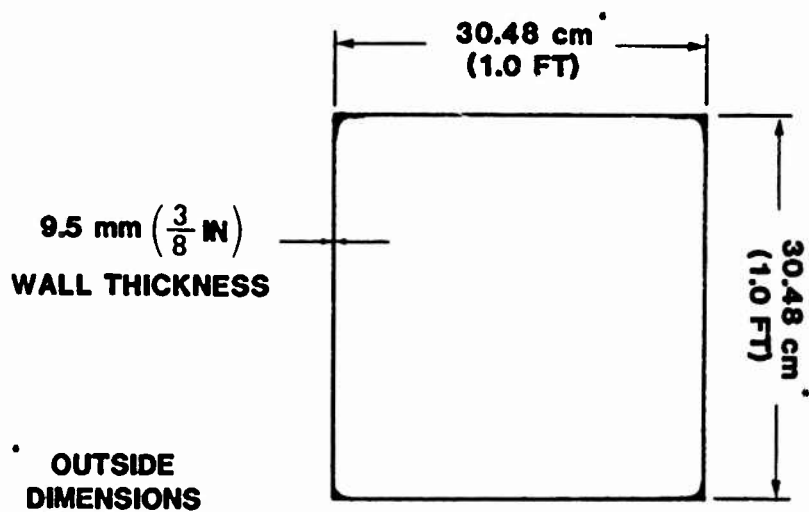
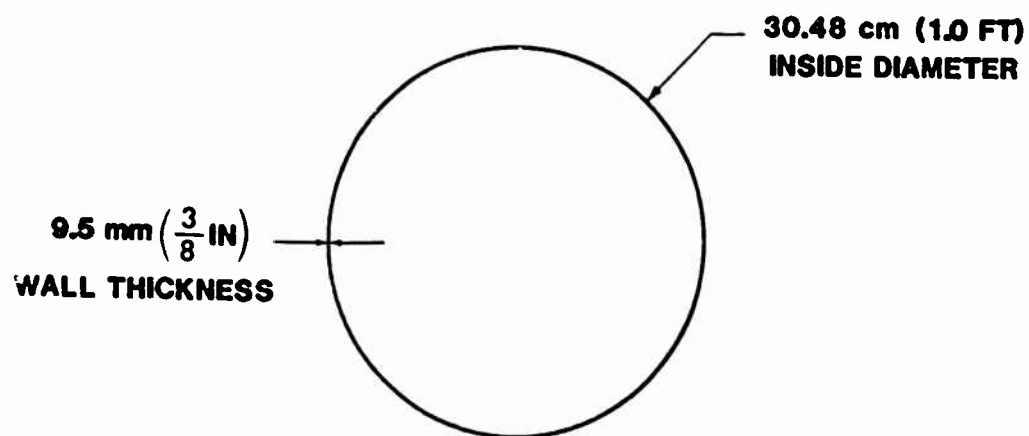


Figure 3.12 Cross-sections of model tunnel.

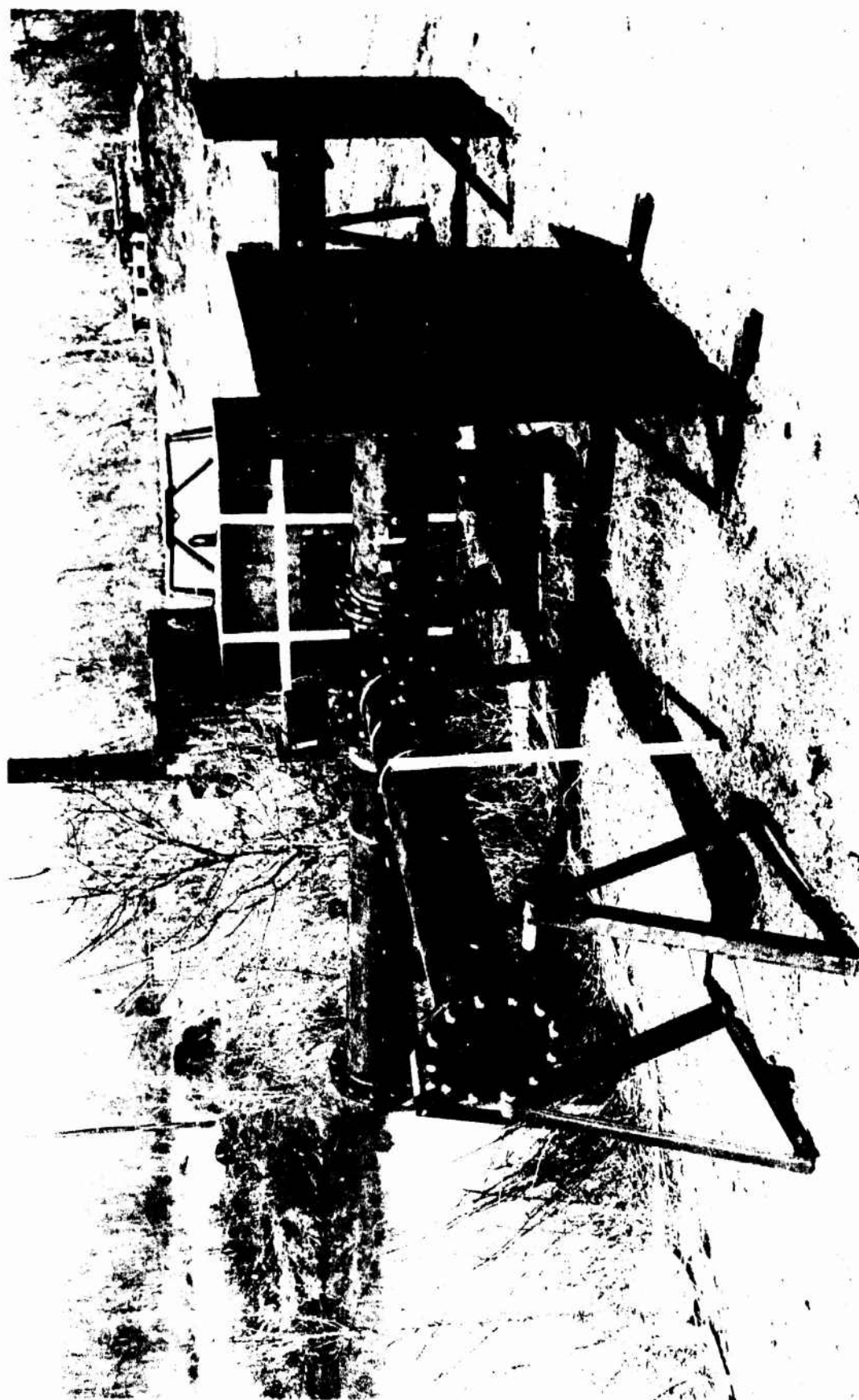


Figure 3.13 Side tunnel structure with round cross-section.

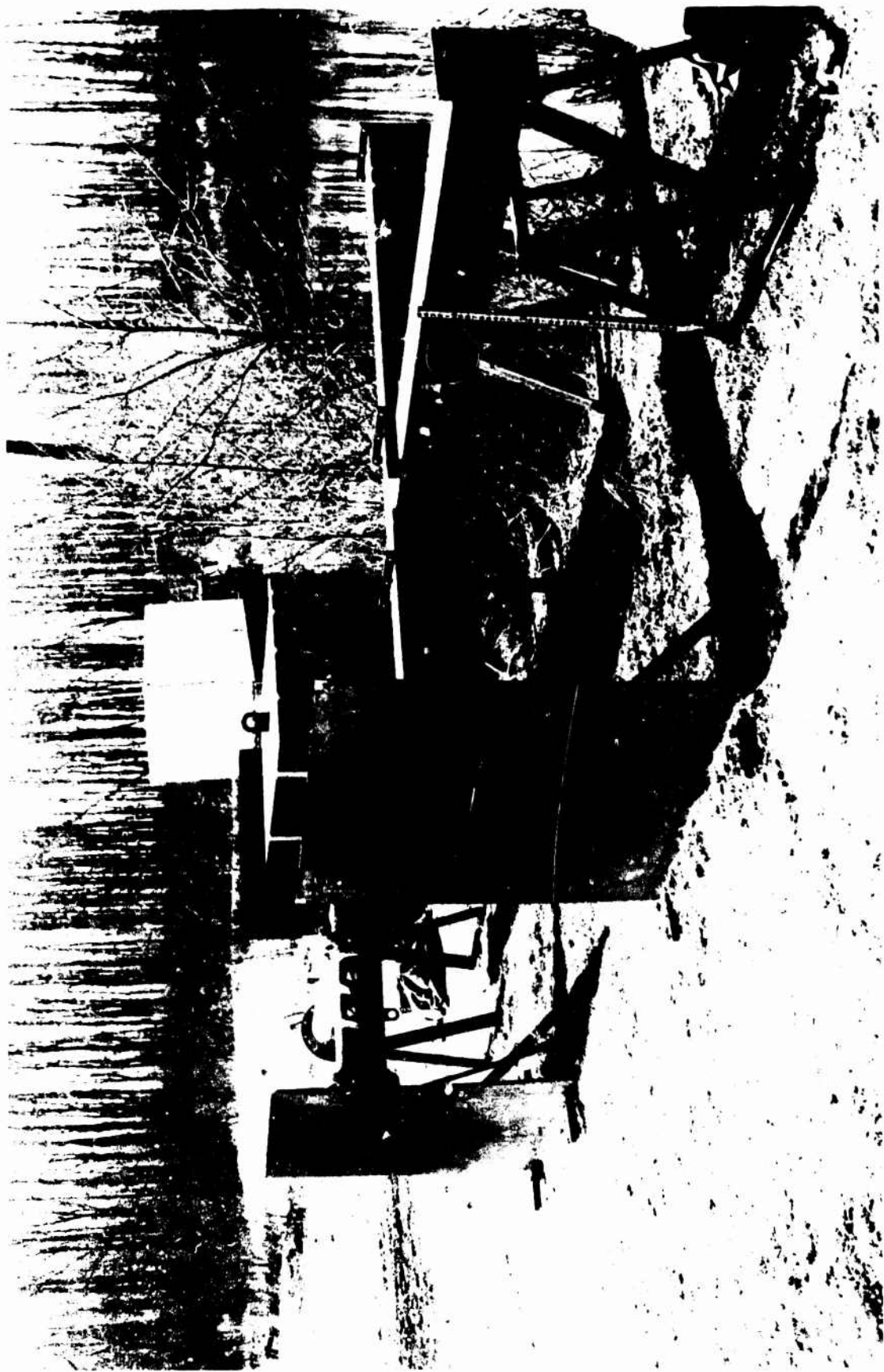


Figure 3.14 Side tunnel structure with square cross-section.



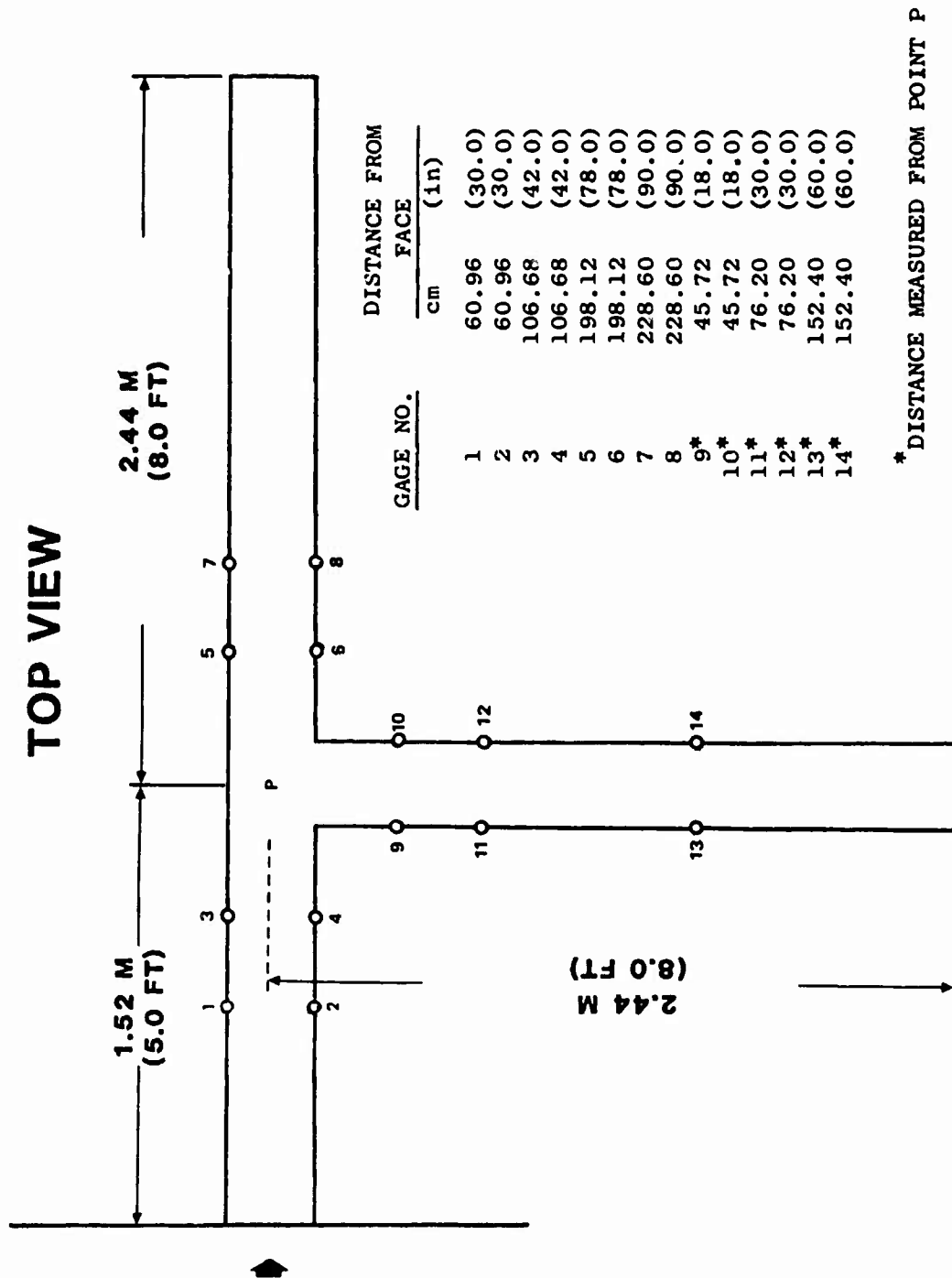


Figure 3.15 Dimensions and gage locations of side tunnel structure with round cross-section.

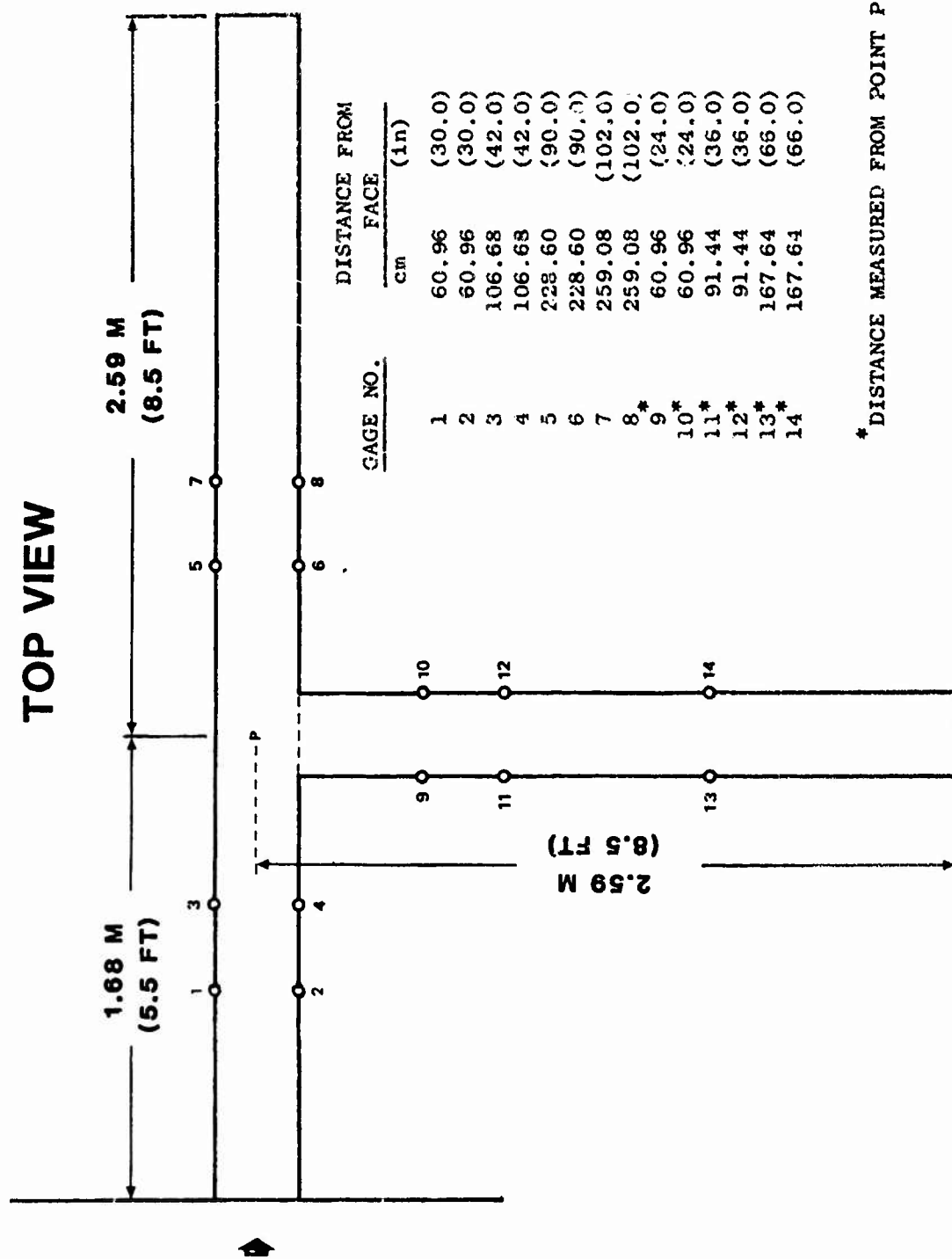


Figure 3.16 Dimensions and gage locations of side tunnel structure with square cross-section.



Figure 3.17 "T" tunnel structure with round cross-section.

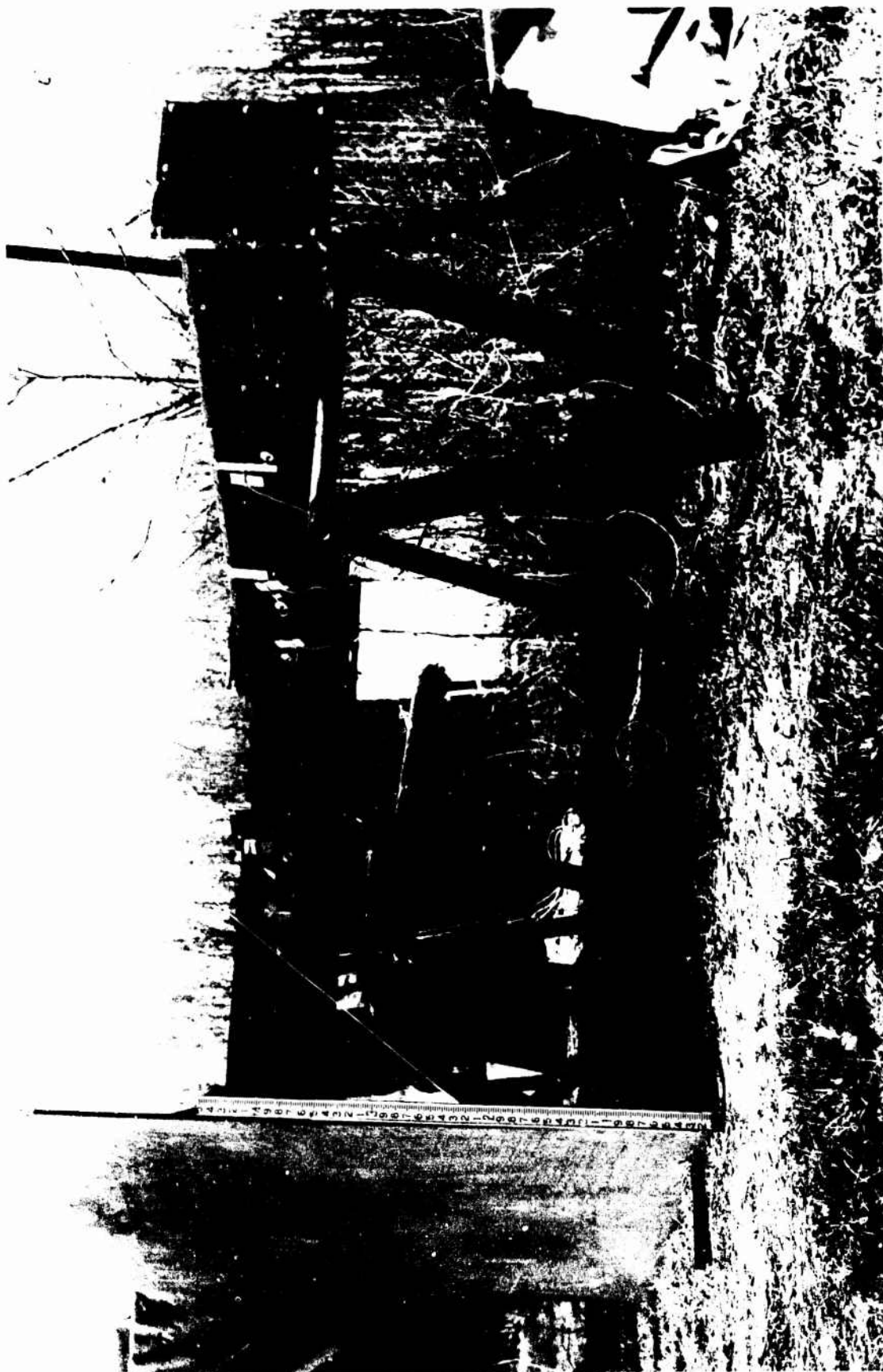
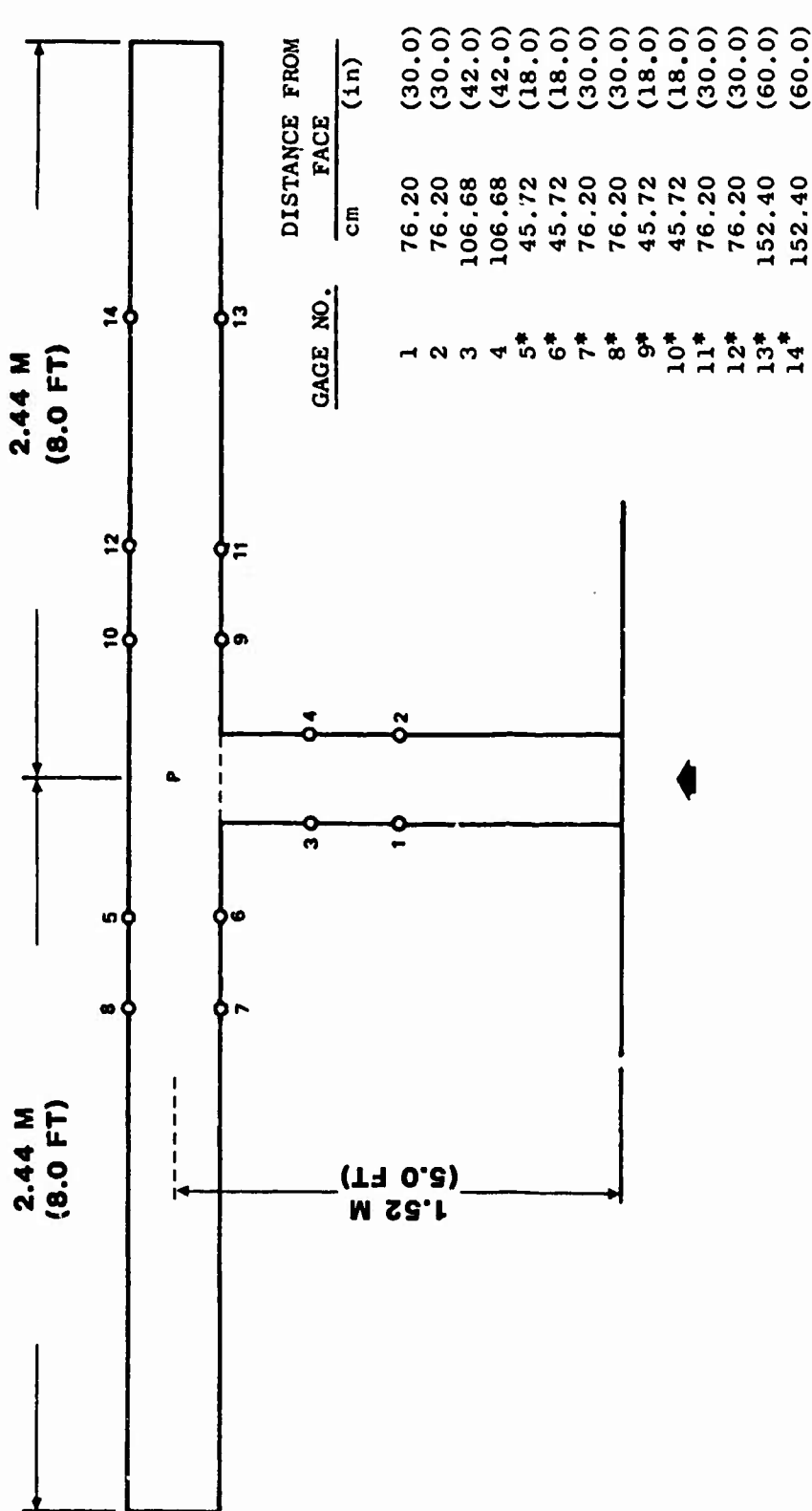


Figure 3.18 "T" tunnel structure with square cross-section.

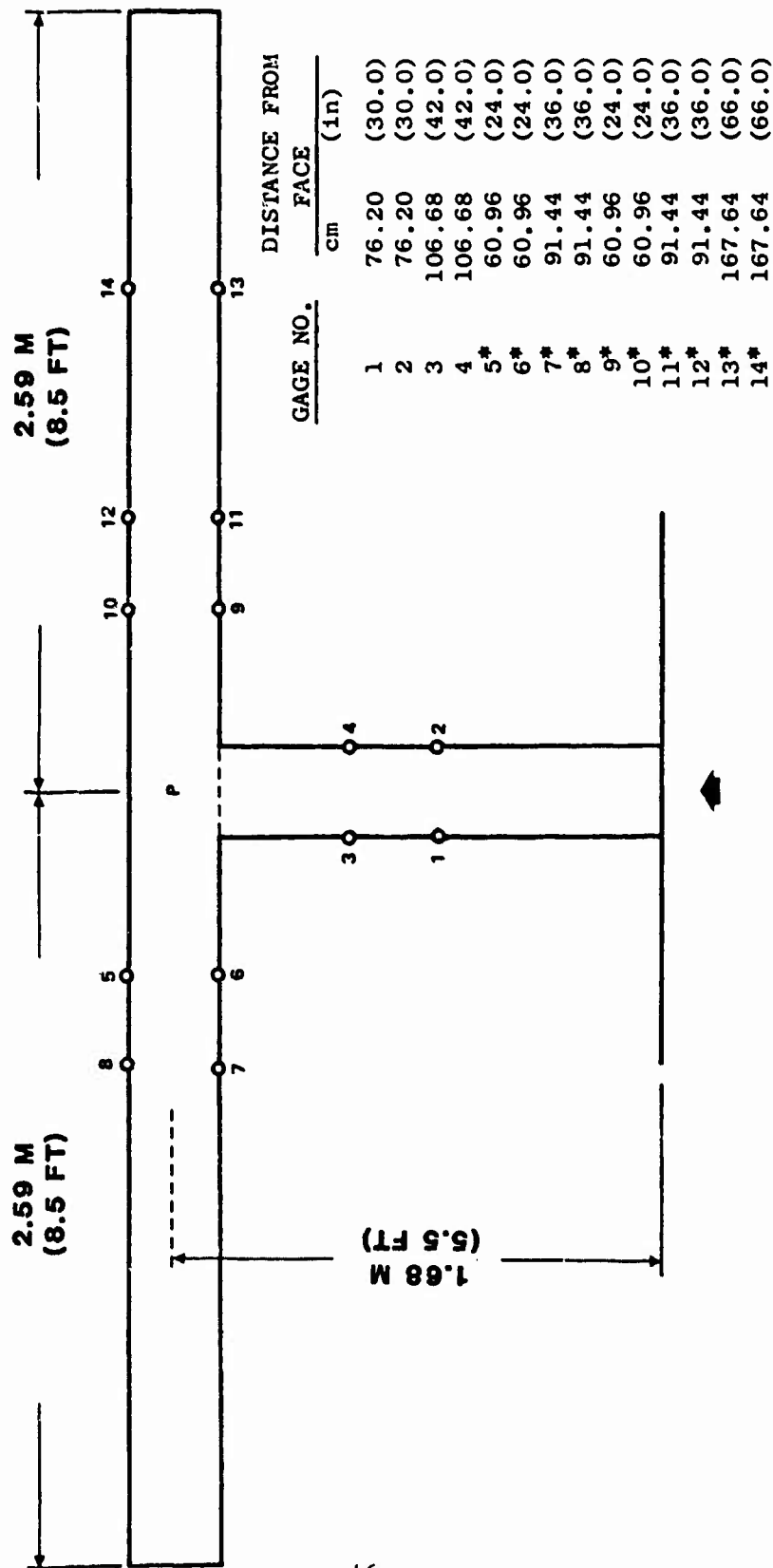
# TOP VIEW



\* DISTANCE MEASURED FROM POINT P

Figure 3.19 Dimensions and gage locations of "T" tunnel structure with round cross-section.

# TOP VIEW



\* DISTANCE MEASURED FROM POINT P

Figure 3.20 Dimensions and gage locations of "T" tunnel structure with square cross-section.



Figure 3.21 Ninety degree bend tunnel.

# TOP VIEW

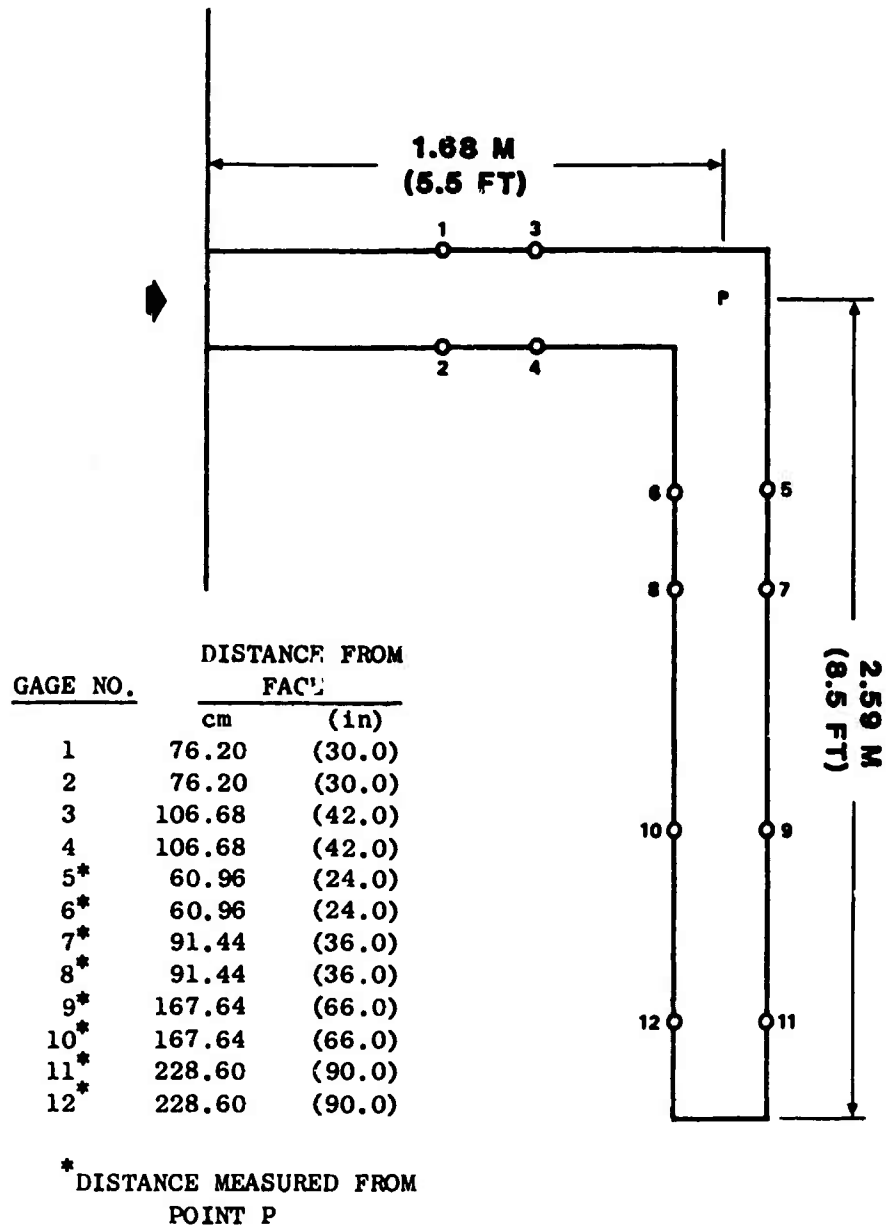
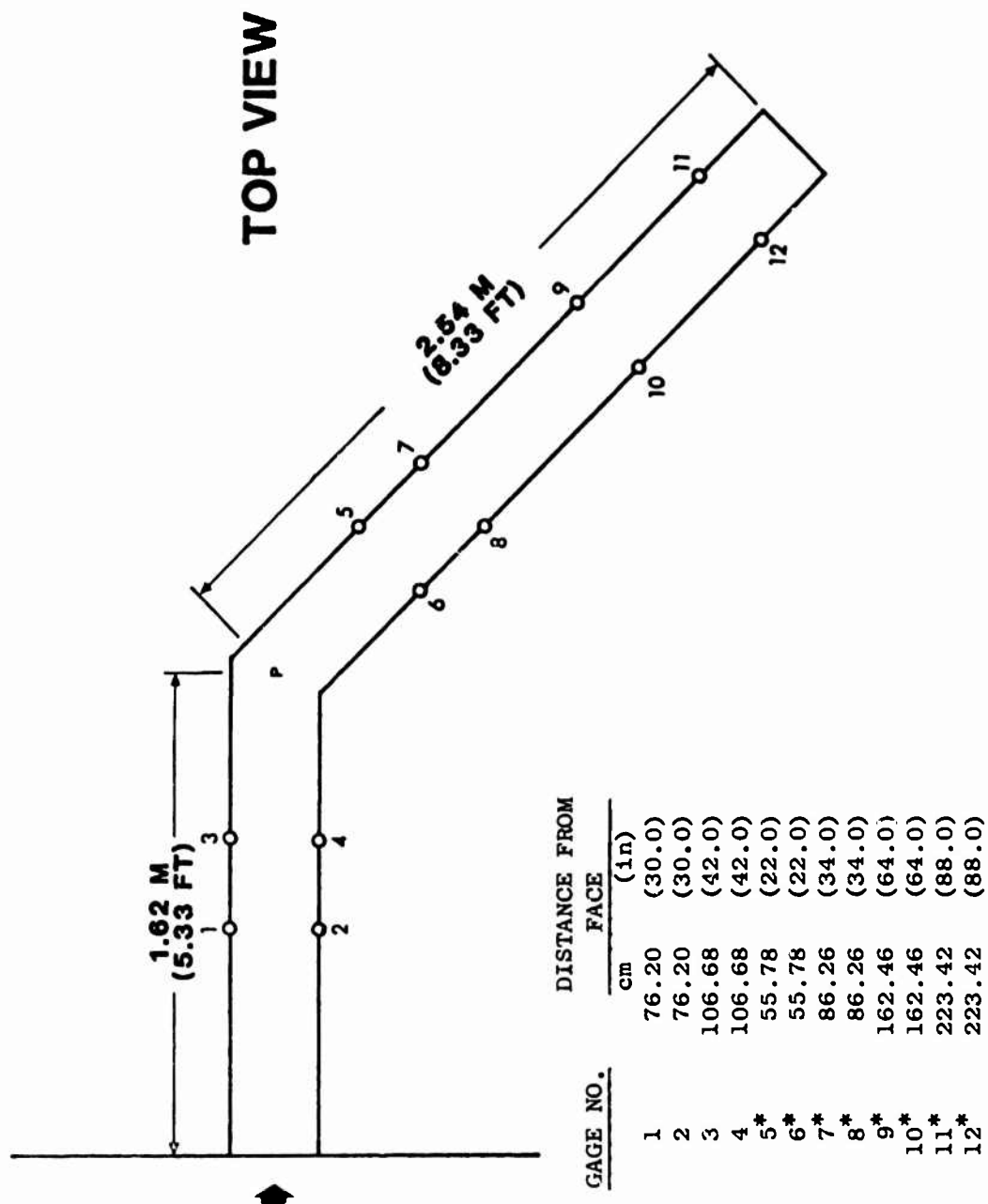


Figure 3.22 Dimensions and gage positions of 90 degree bend tunnel.





Figure 3.23 Forty-five degree bend tunnel.



\* DISTANCE MEASURED FROM  
POINT P

Figure 3.24 Dimensions and gage positions of 45 degree bend tunnel.

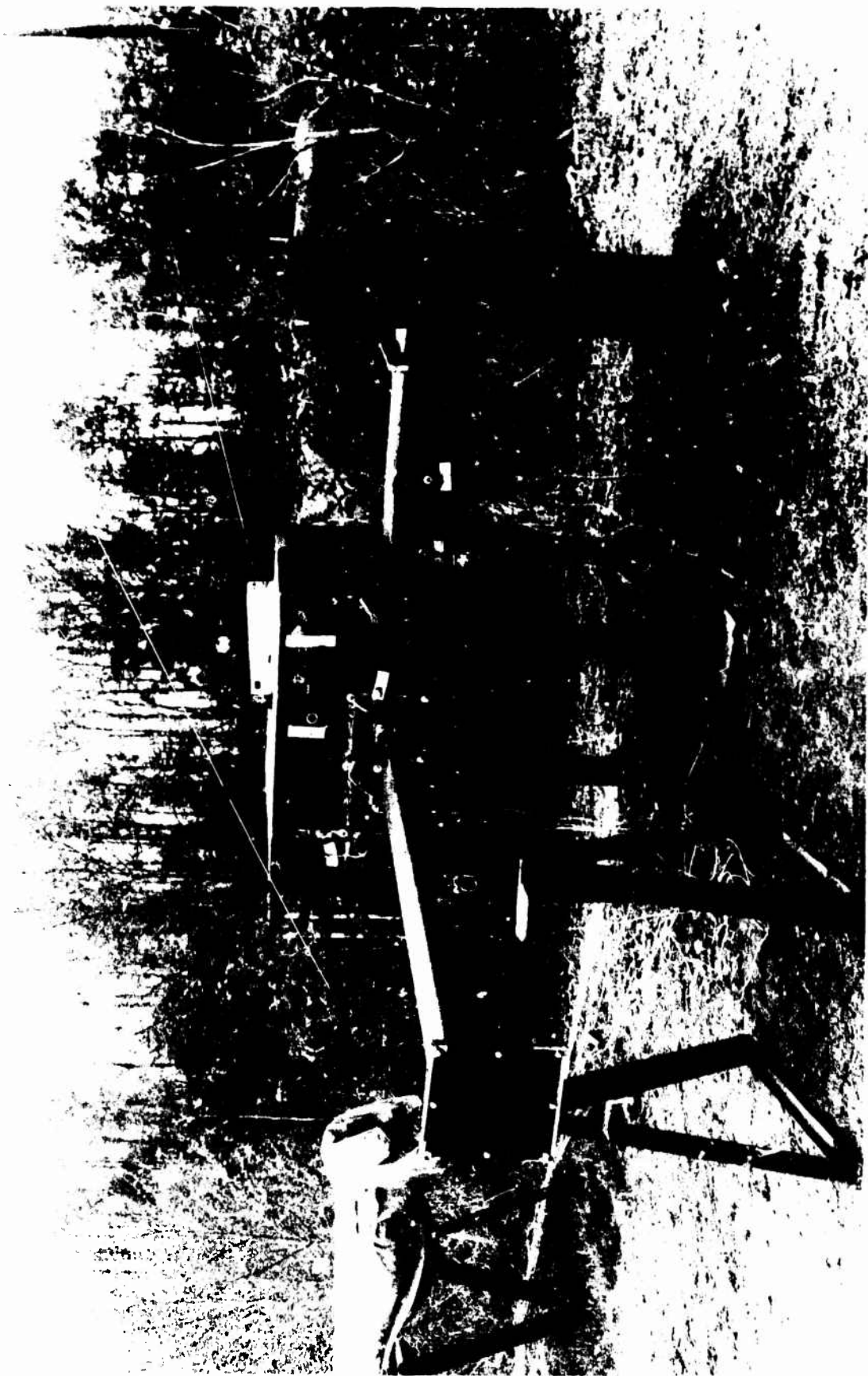


Figure 3.25 Vented expansion chamber structure.

## TOP VIEW

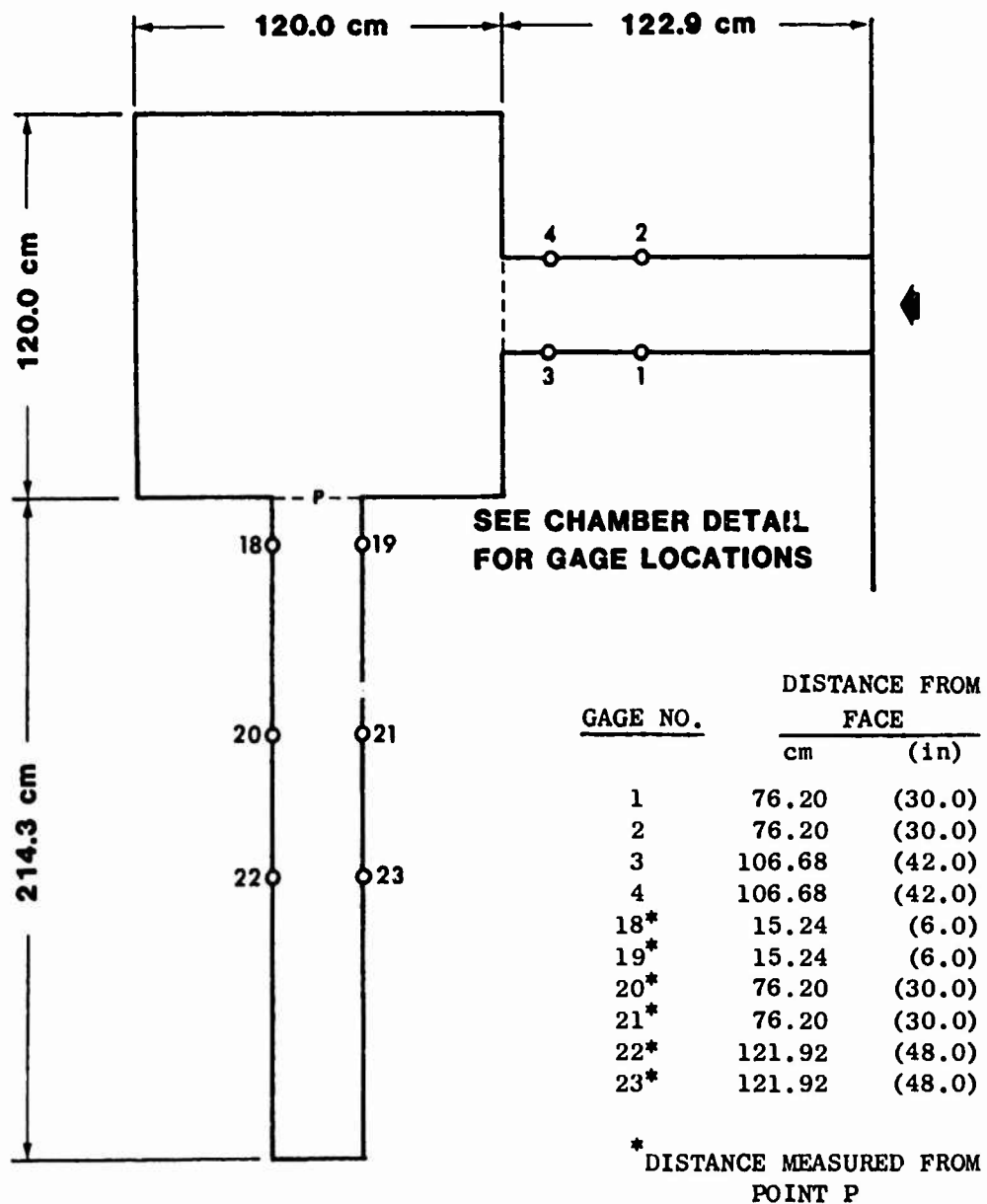


Figure 3.26 Top view of vented expansion chamber and gage locations in entrance and exit tunnels.

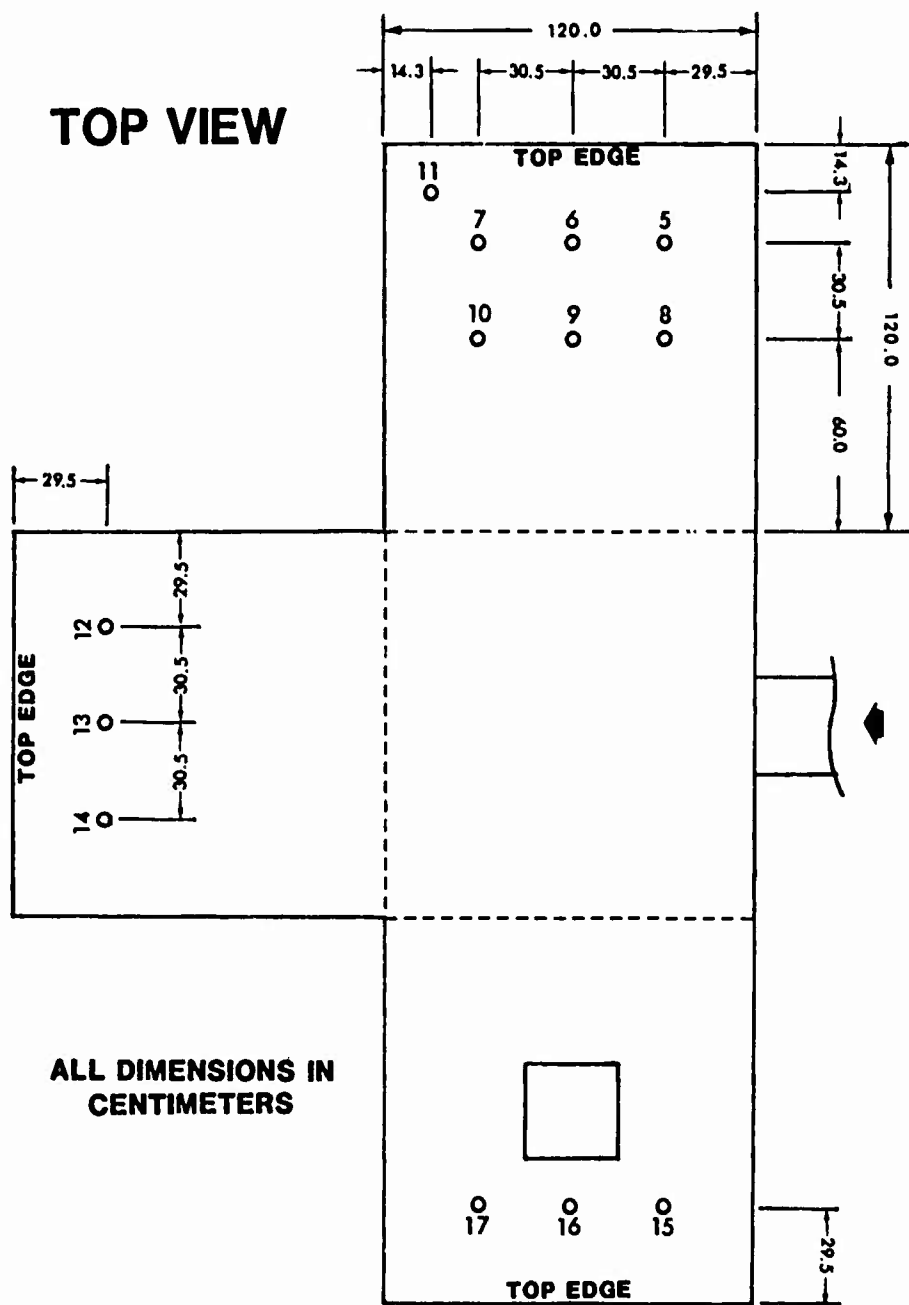
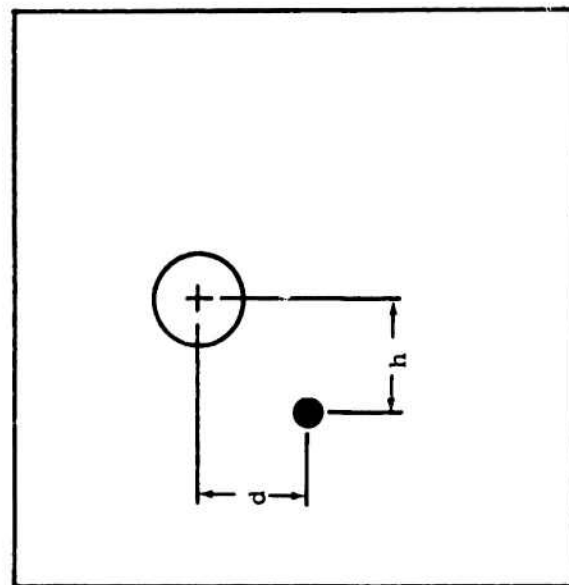
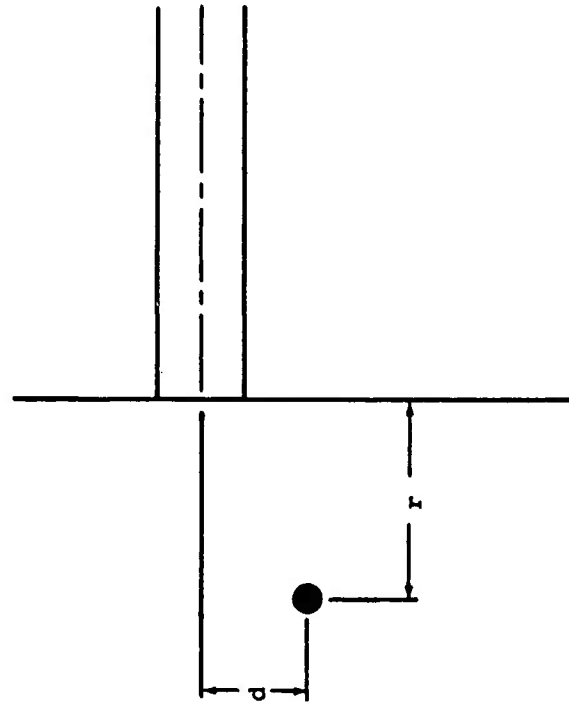


Figure 3.27 Gage locations on inside walls of expansion chamber.

# CHARGE LOCATION



FRONT VIEW



SIDE VIEW

Figure 3.28 Charge geometry.

## CHAPTER 4

### AIRBLAST MEASUREMENTS

The measured pressure time records and the impulse or integral of the pressure is given in Appendix A for the 1981 test series and in Appendix B for the 1982 series. Characteristic peak pressures, impulses and times are given in the tables of Appendices C and D. The parameters of the tables are defined in Figure 4.1.

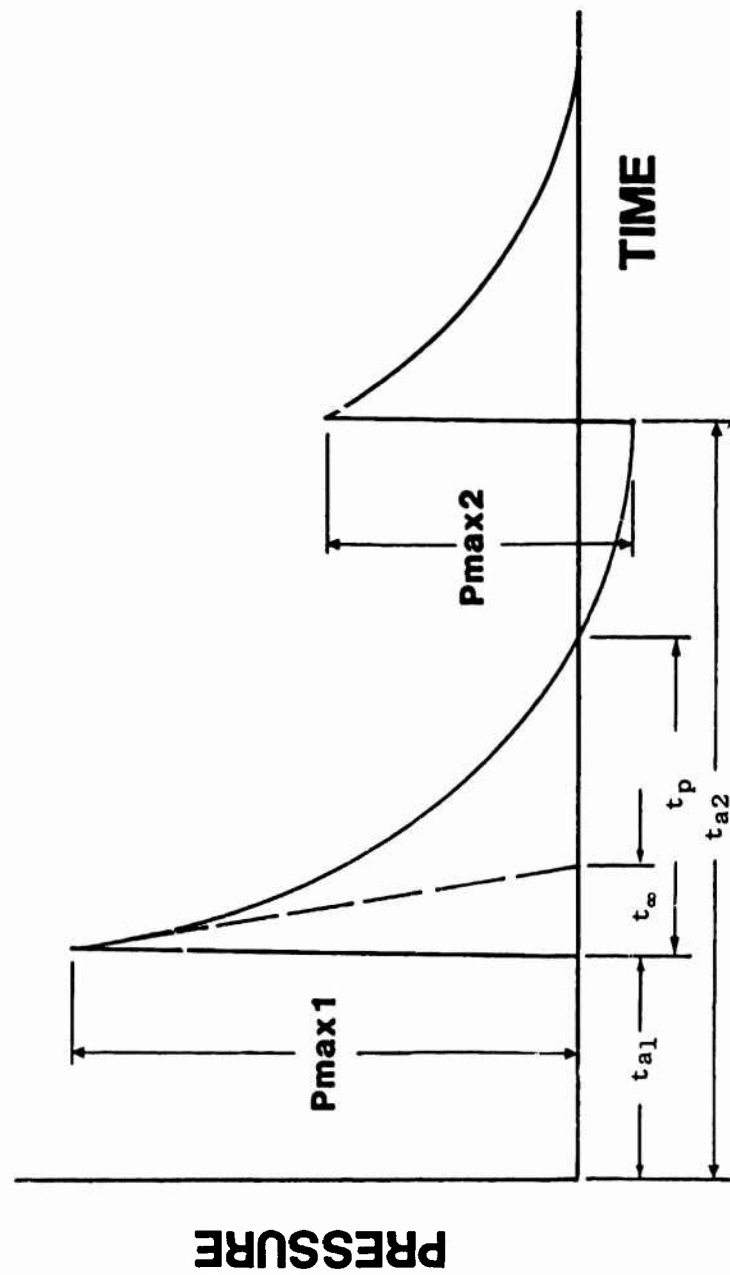


Figure 4.1 Definition of tabulated blast parameters.



## CHAPTER 5

### CONCLUSIONS

The data presented in this report are the result of the first phase of an experimental effort conducted by WES. Further small-scale explosive tests are being performed, with test descriptions and results to be published in later reports.

A limited analysis of the results of the first phase resulted in several general observations, which include:

- 1) Blast attenuation of short duration pulses in straight tunnels involves some different mechanisms than those which dominate for longer duration pulses. Formulae used for long duration pulses do not work well for short duration pulses.
- 2) Side-on blast pressures at one diameter into the tunnel agree with shock tube values of the transmitted pressures. However, blast attenuation before and beyond is much different from the shock tube results.
- 3) The processes of blast propagation into side tunnels and T-tunnels and around 90 and 45 degree bends produce reflected and diffracted pulses which have quite similar characteristics.

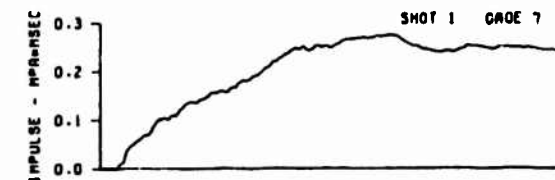
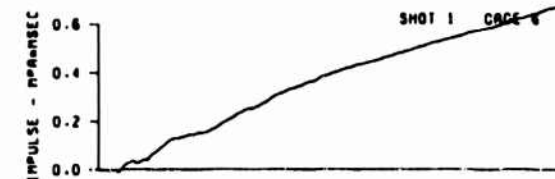
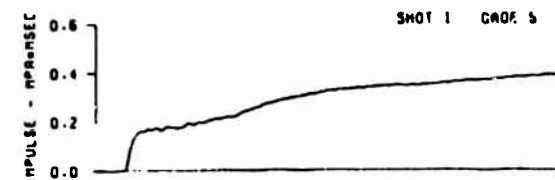
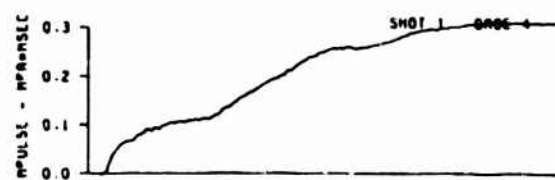
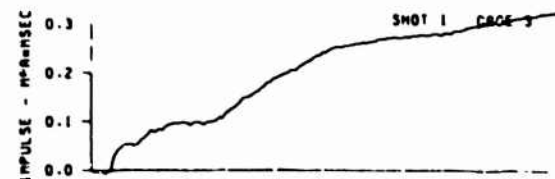
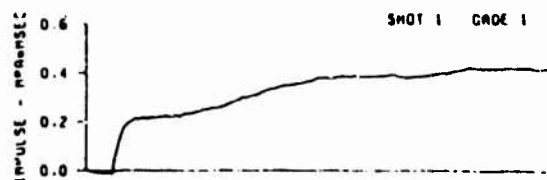
A final, detailed analysis of the experimental data will be performed and reported at a later date.

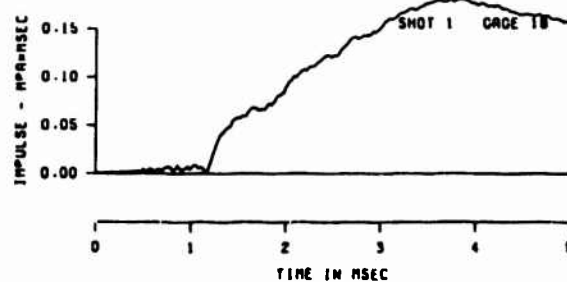
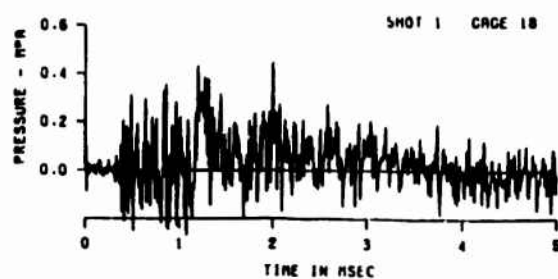
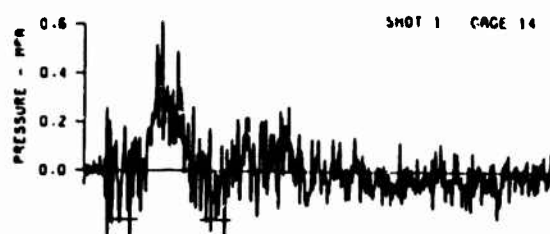
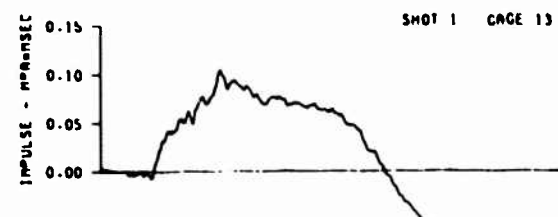
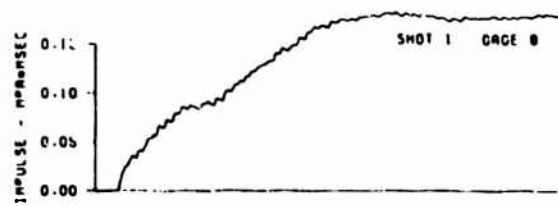
## REFERENCES

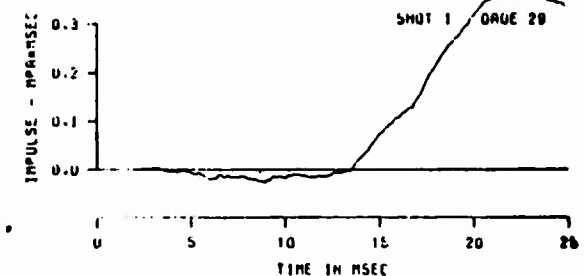
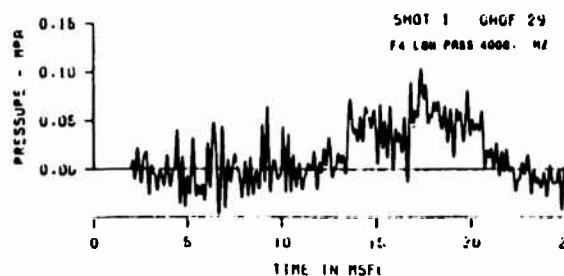
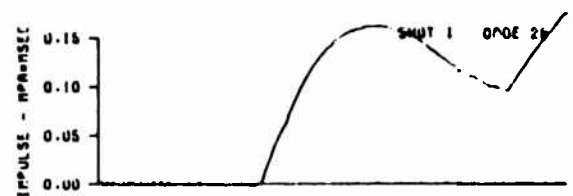
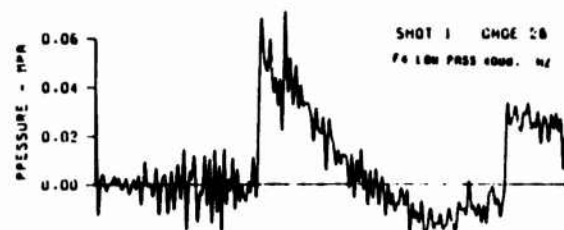
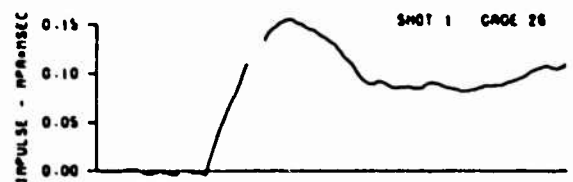
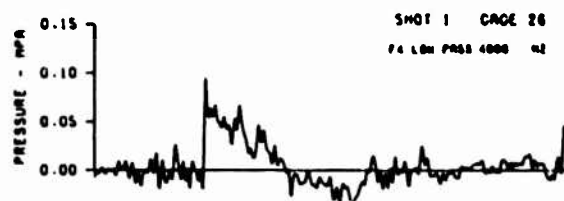
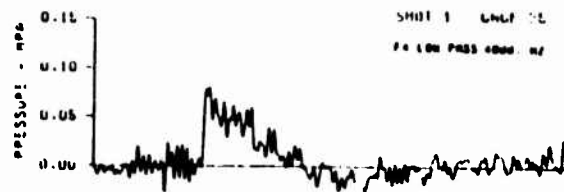
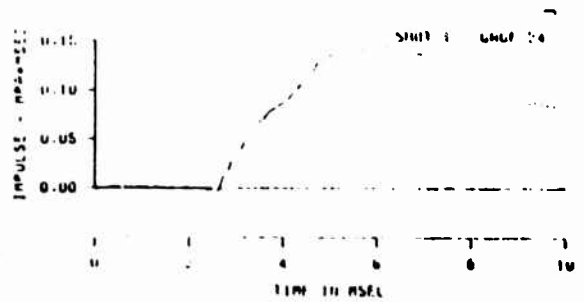
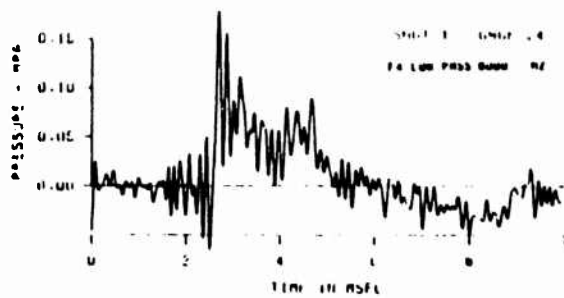
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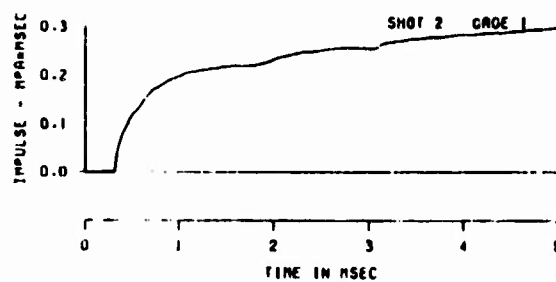
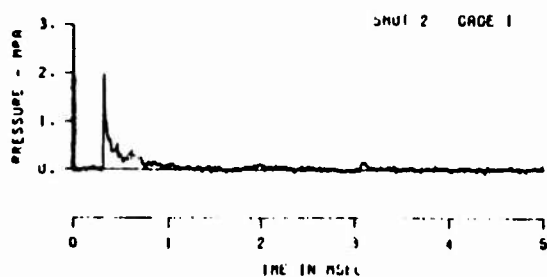
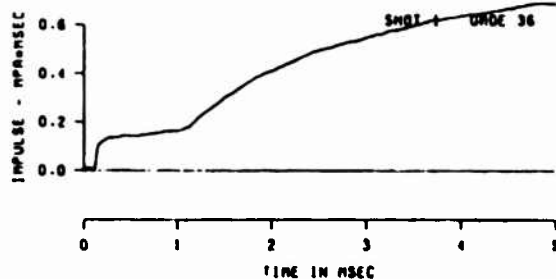
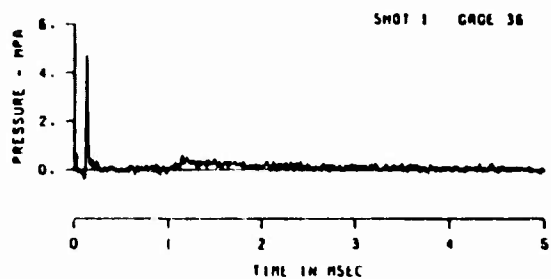
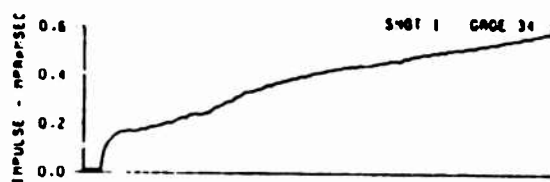
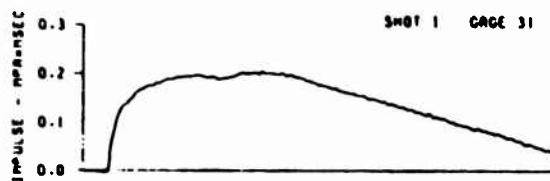
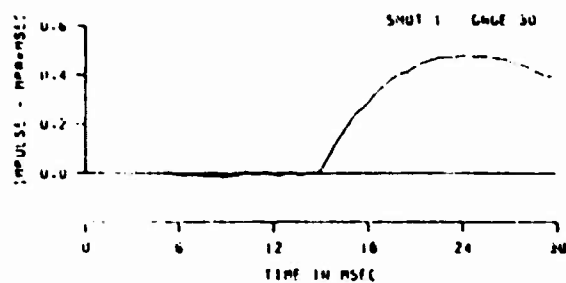
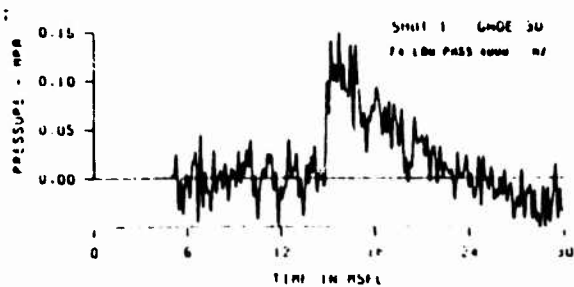
APPENDIX A

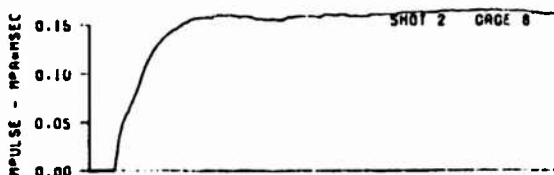
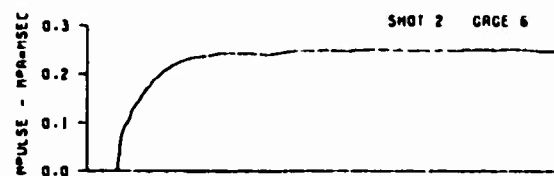
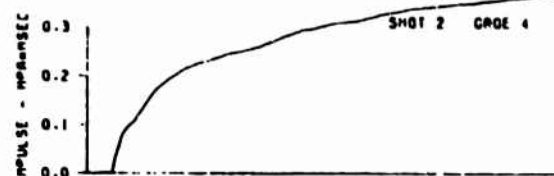
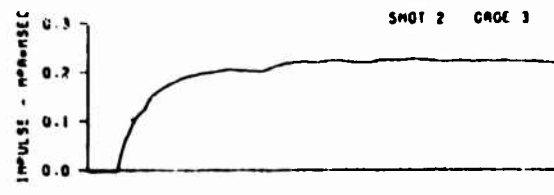
AIRBLAST MEASUREMENTS 1981 SERIES



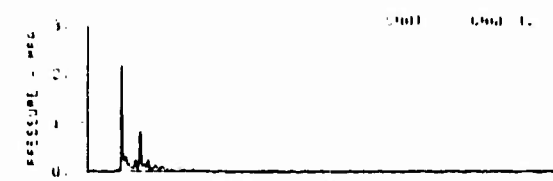
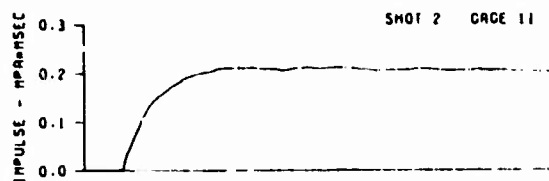
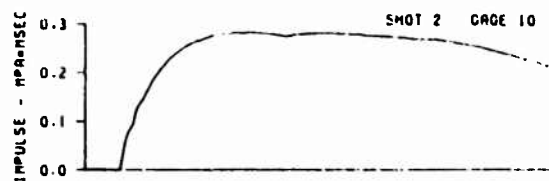
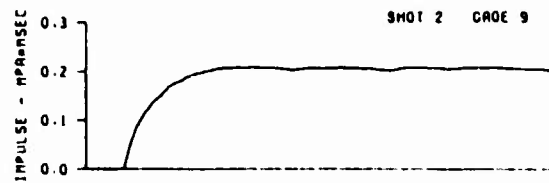


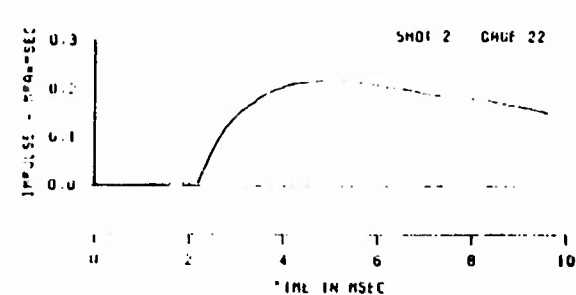
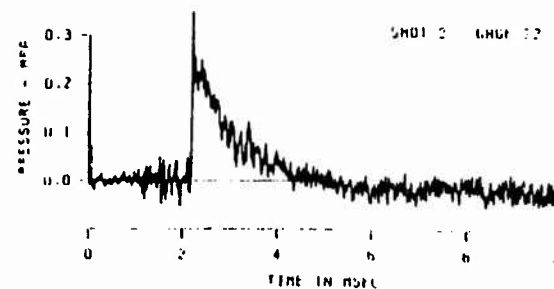
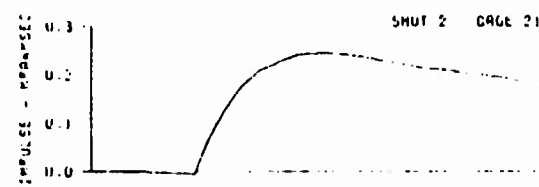
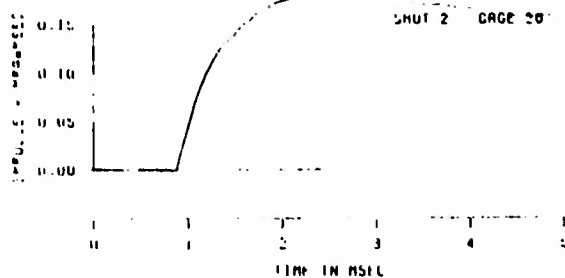
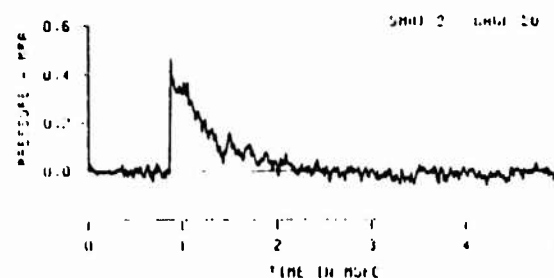
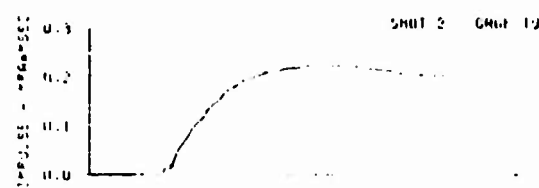
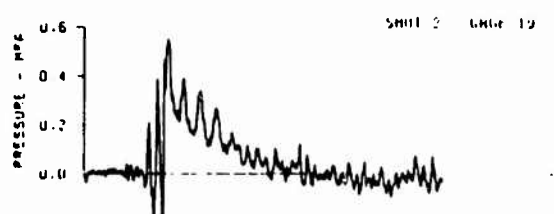
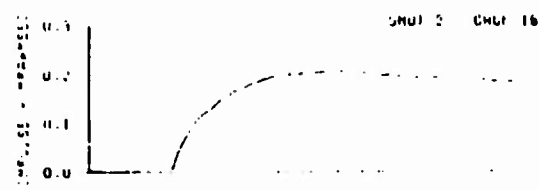
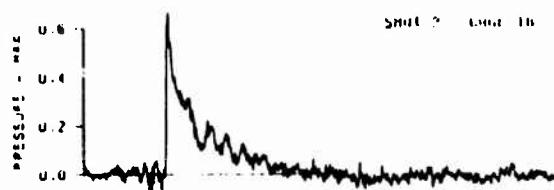
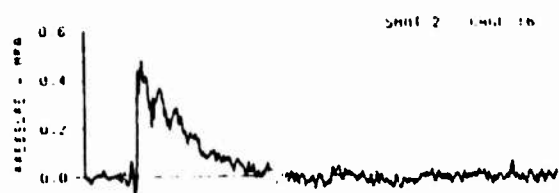


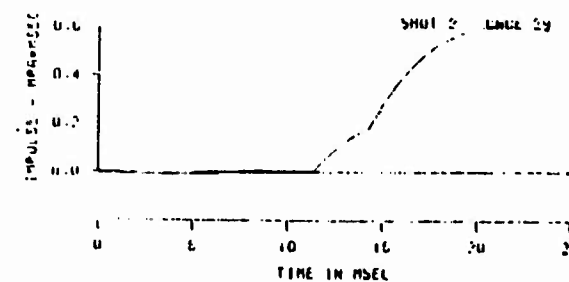
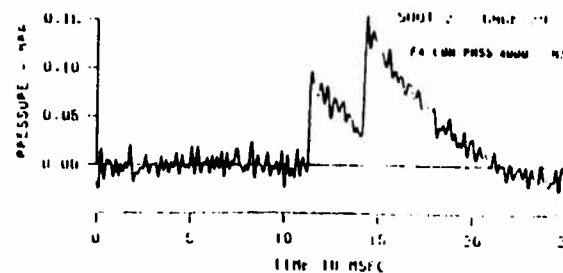
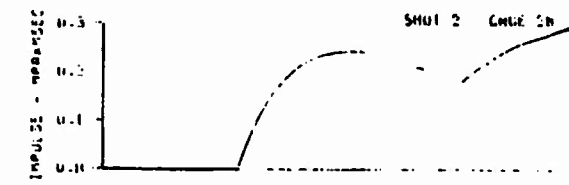
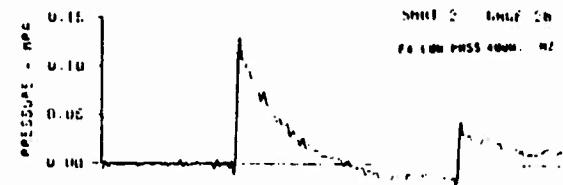
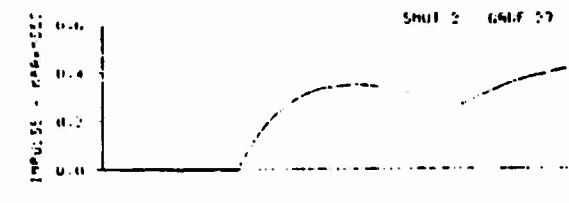
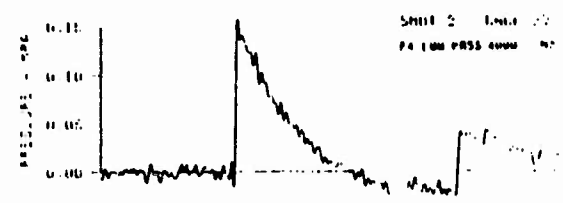
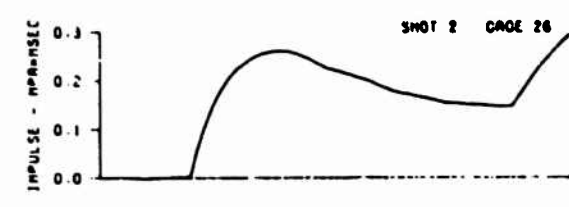
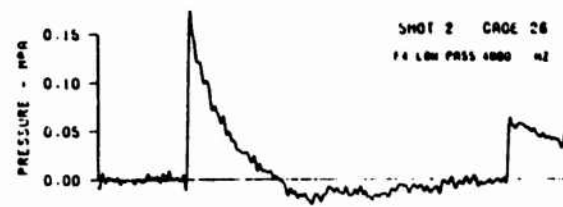
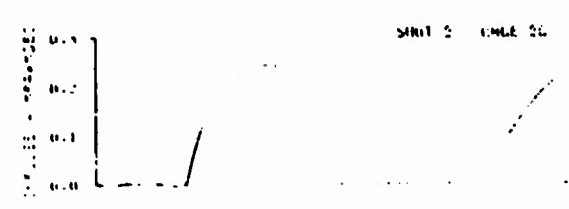
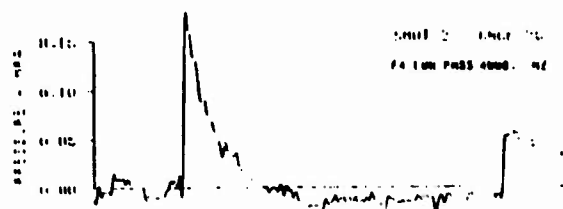
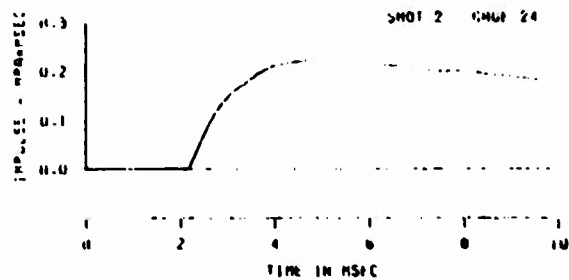
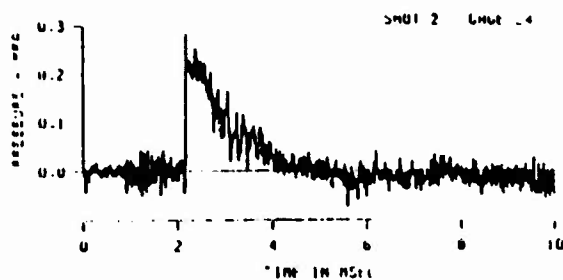


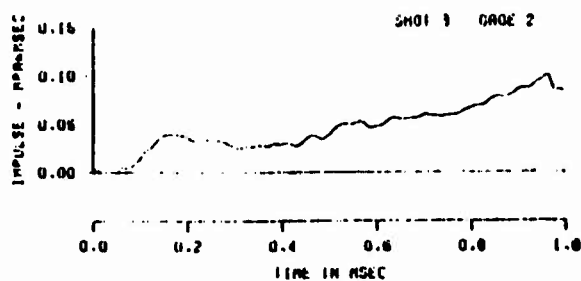
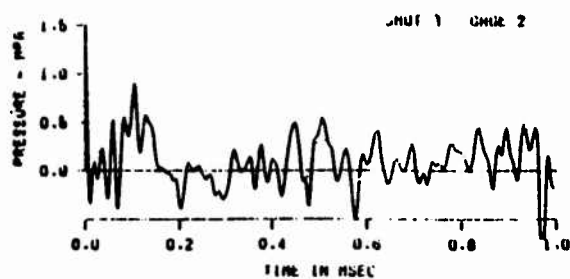
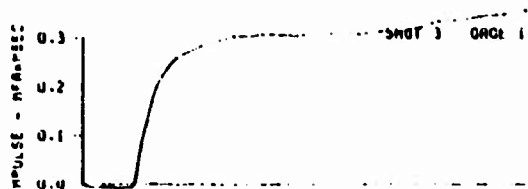
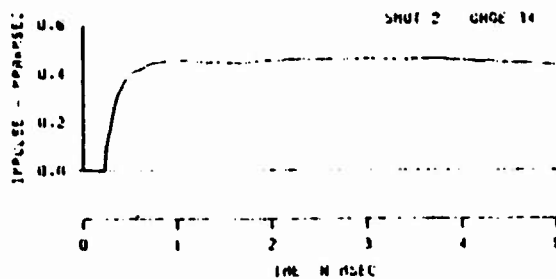
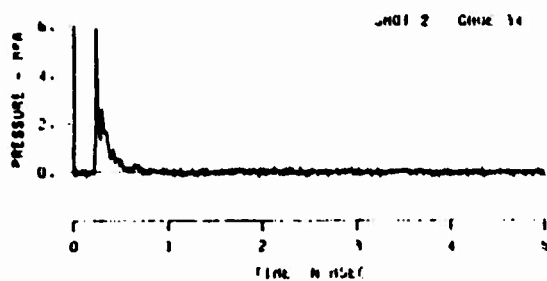
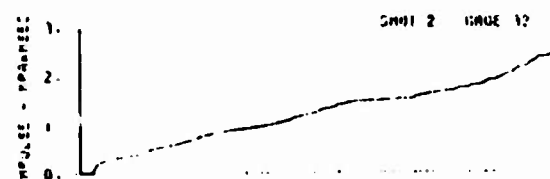
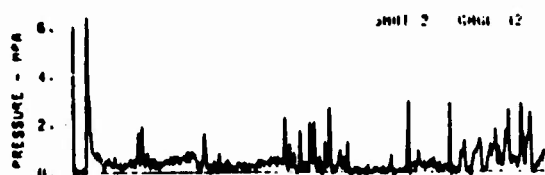
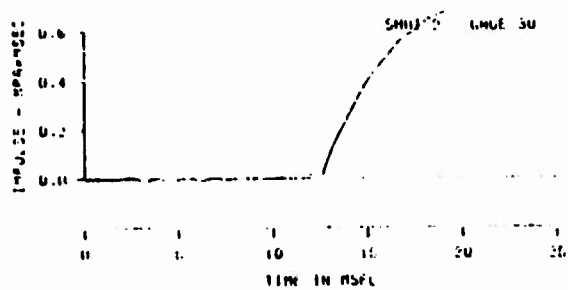
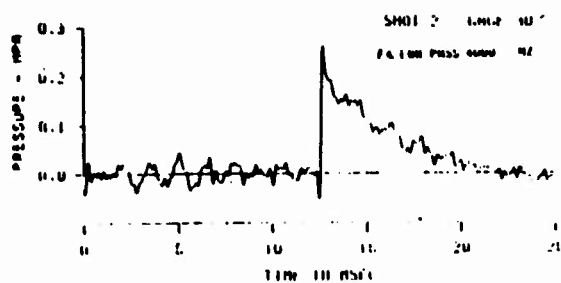


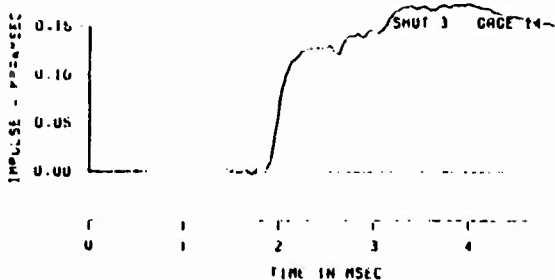
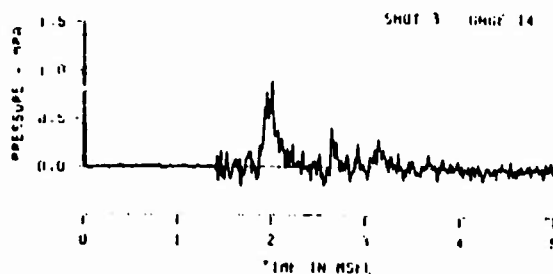
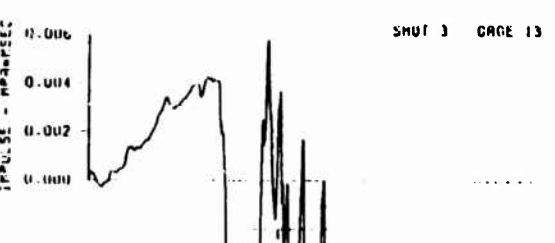
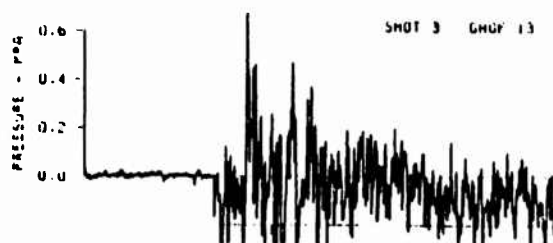
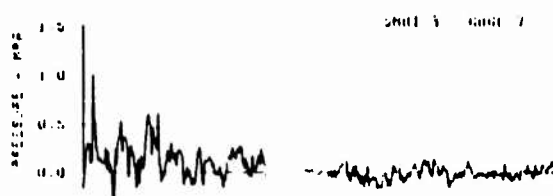


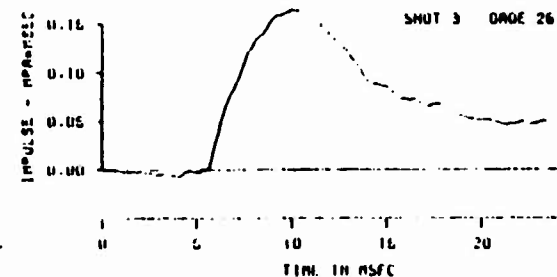
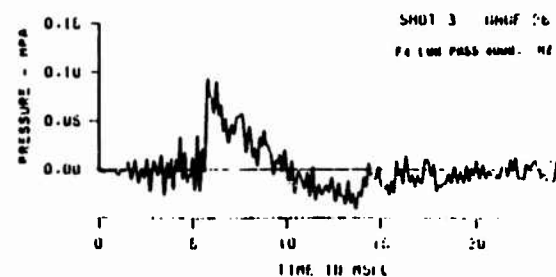
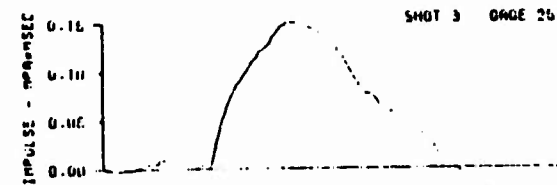
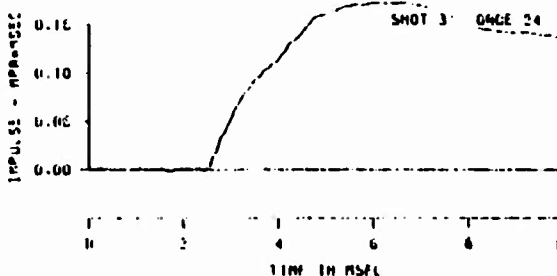
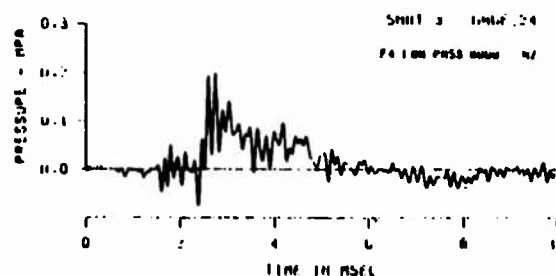
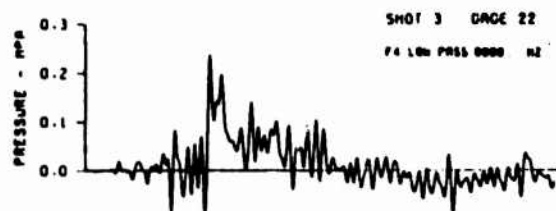
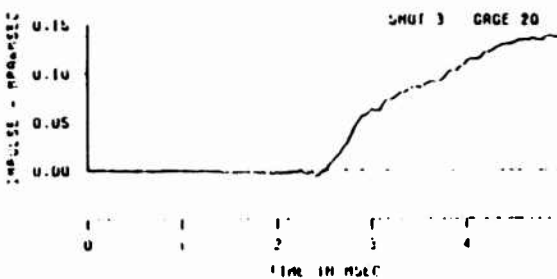
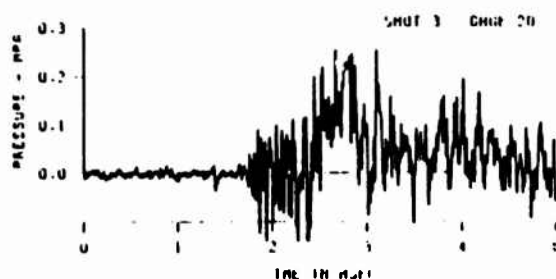
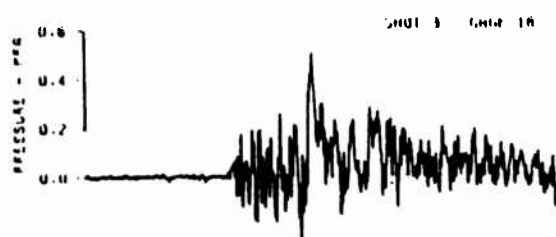


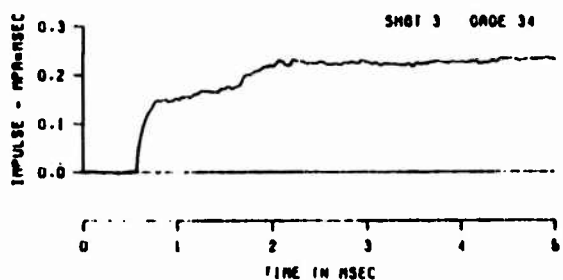
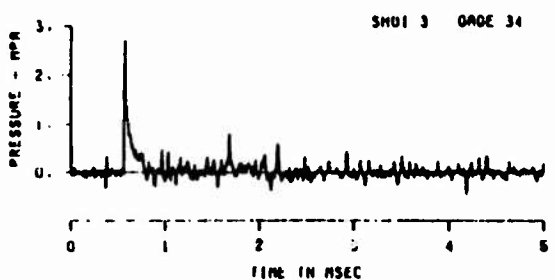
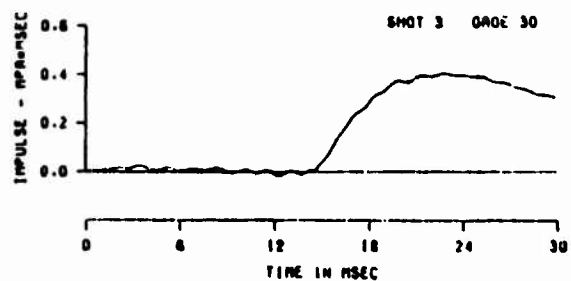
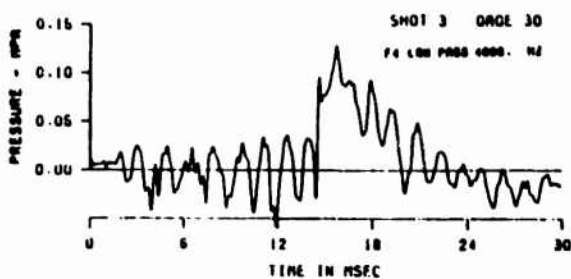
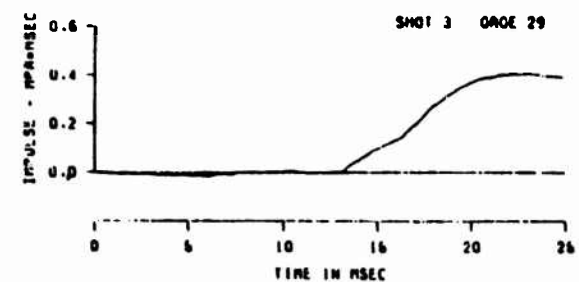
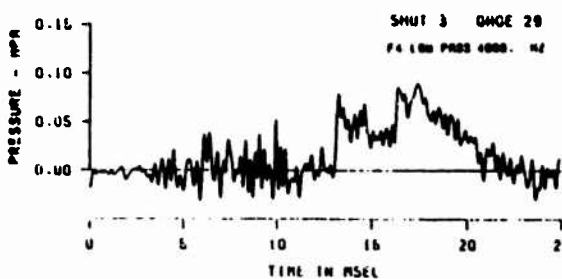
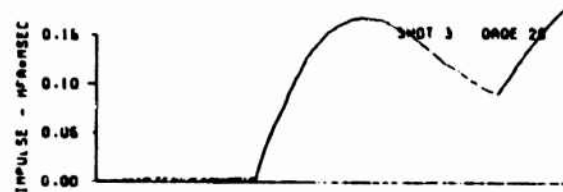
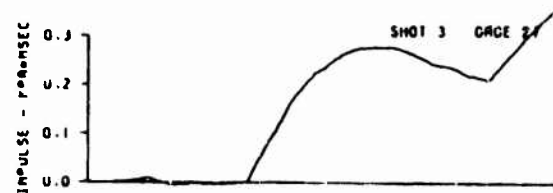
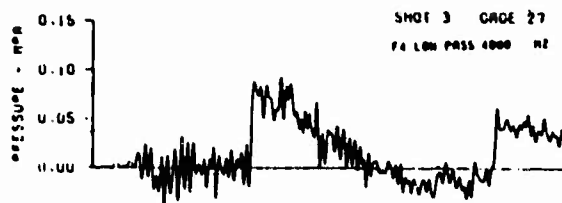


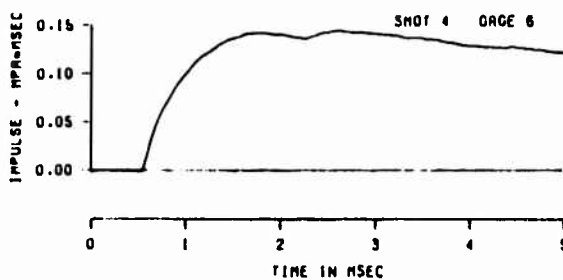
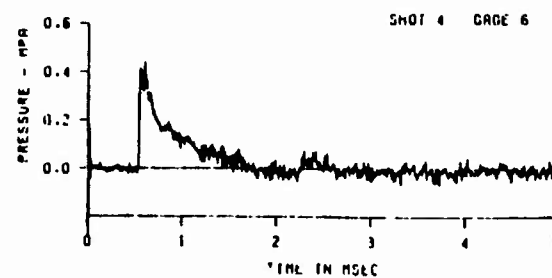
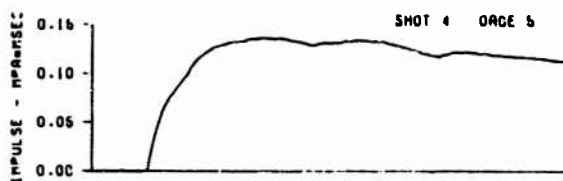
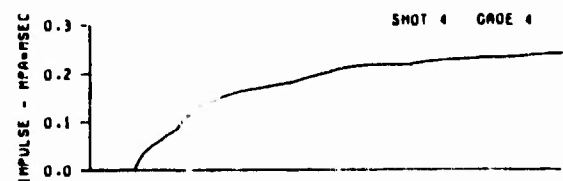
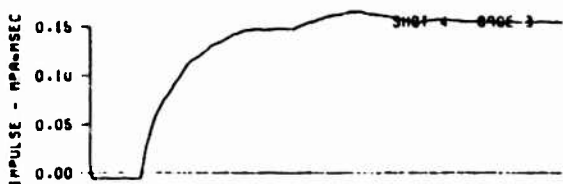
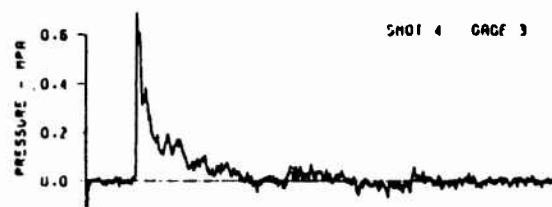
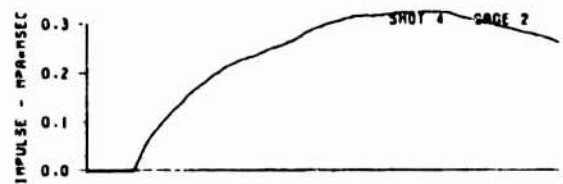
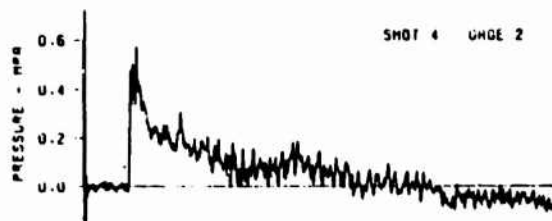
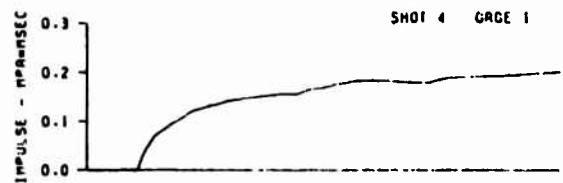




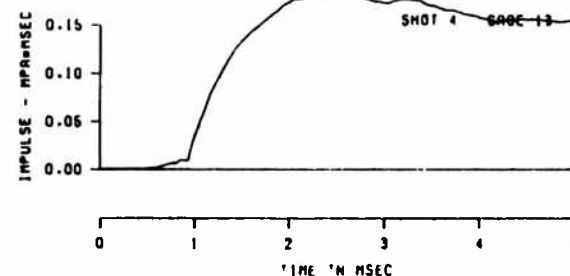
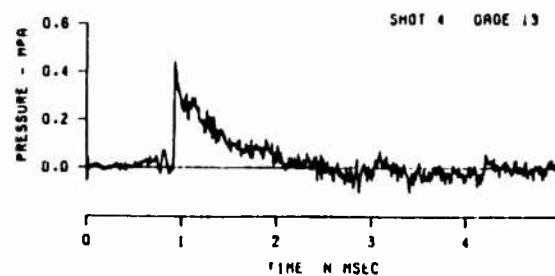
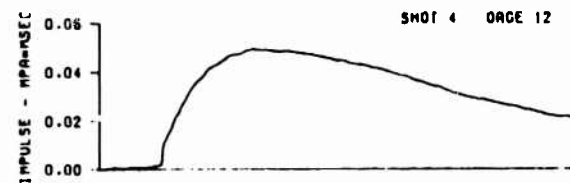
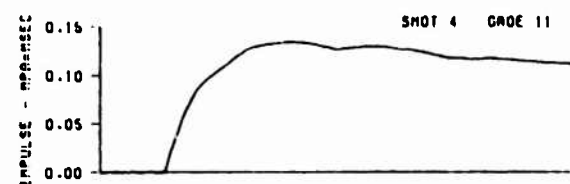
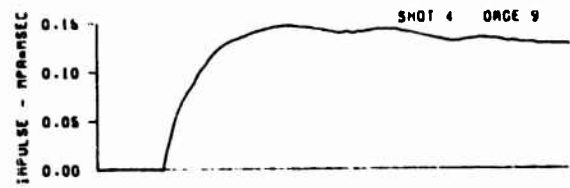
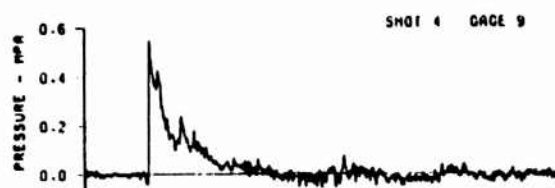
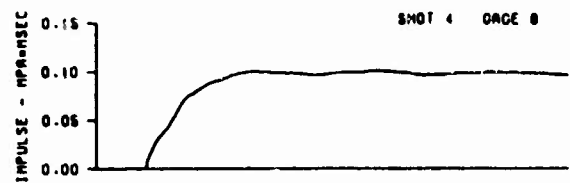
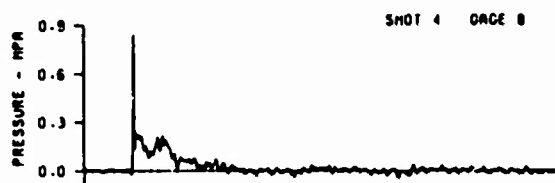
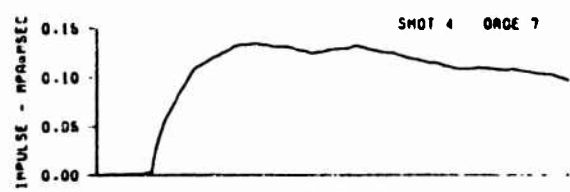


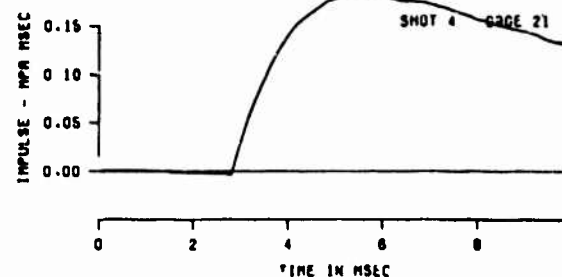
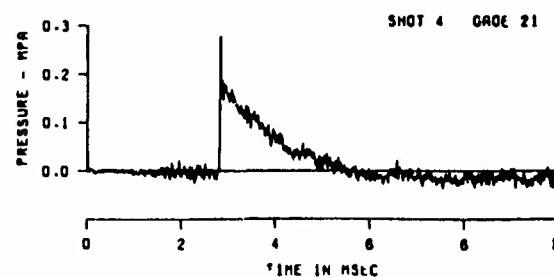
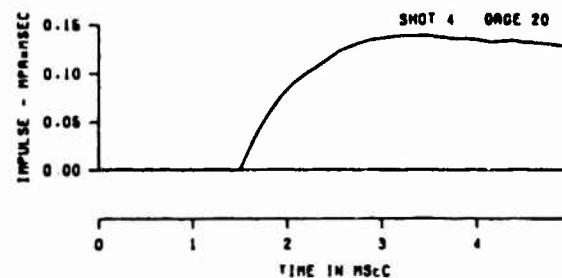
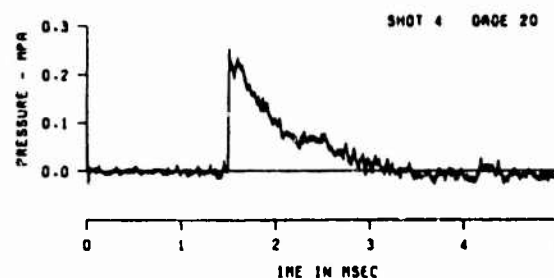
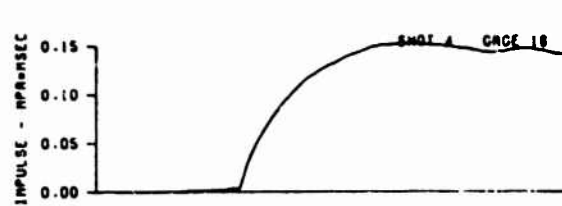
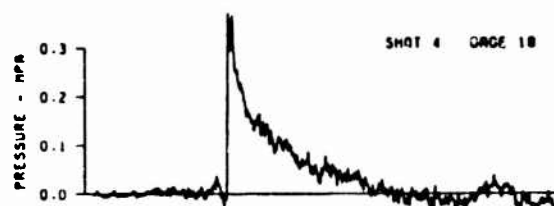
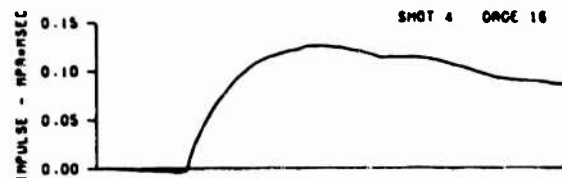
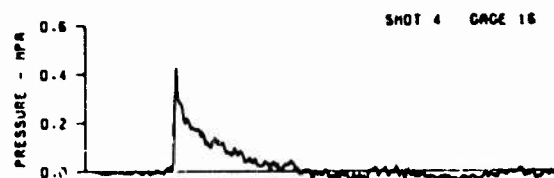
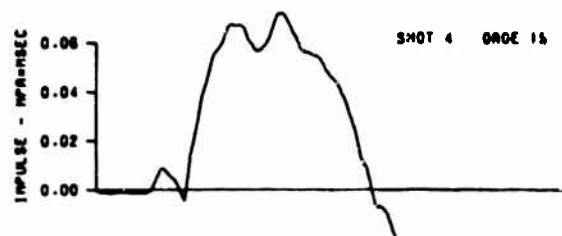
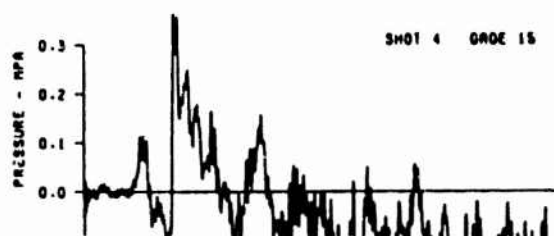
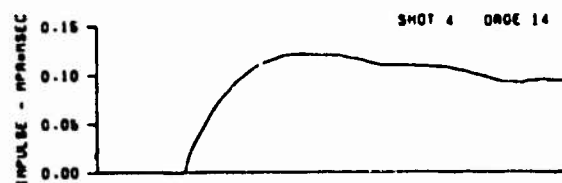
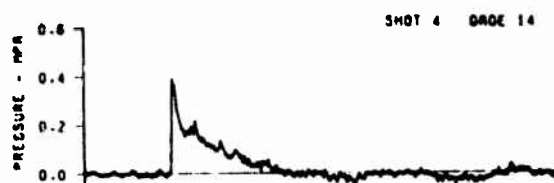


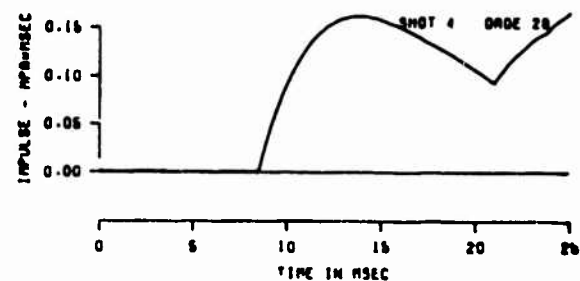
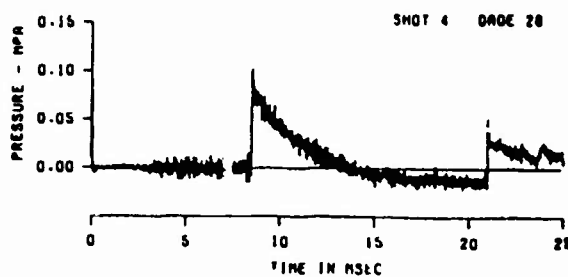
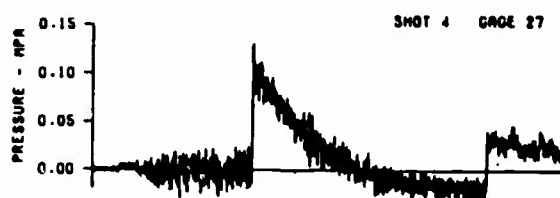
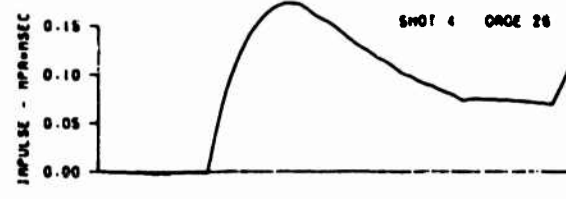
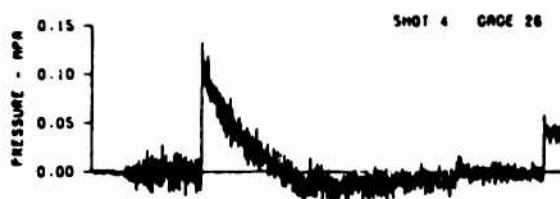
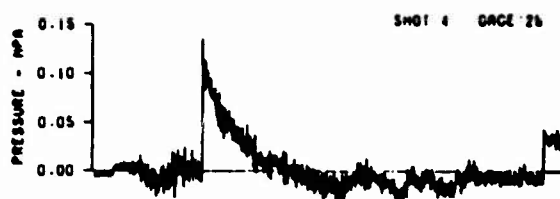
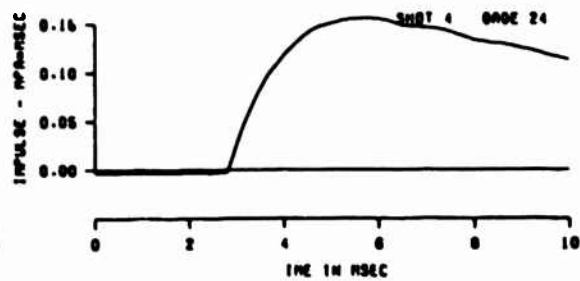
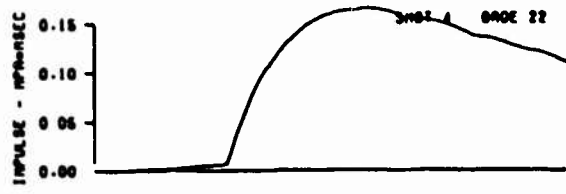
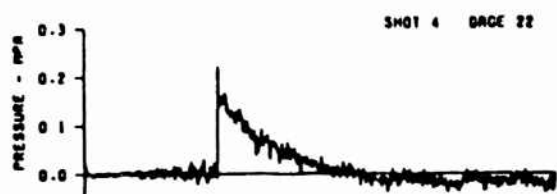


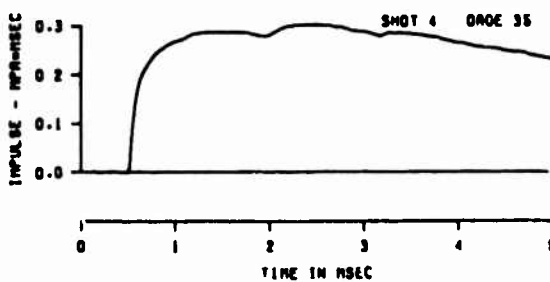
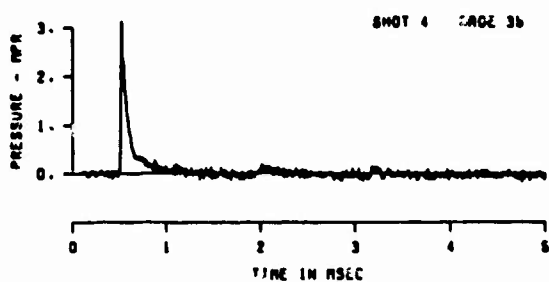
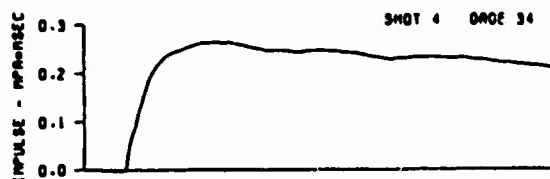
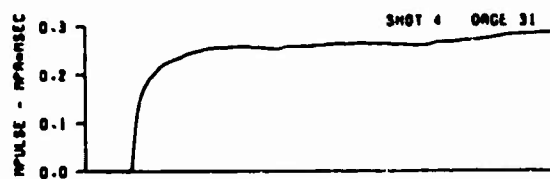
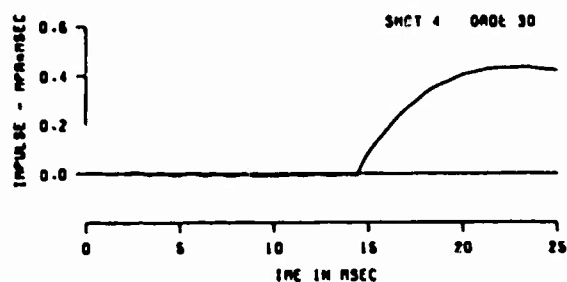
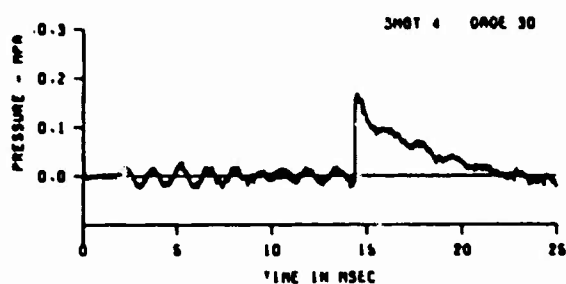
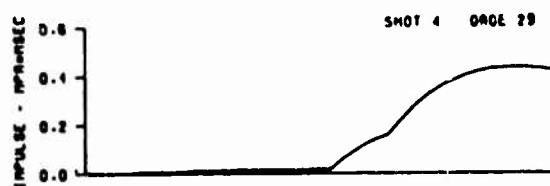


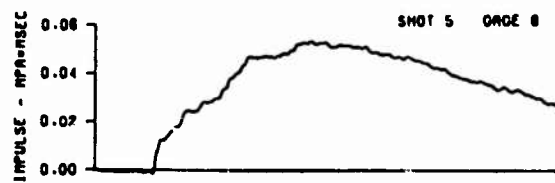
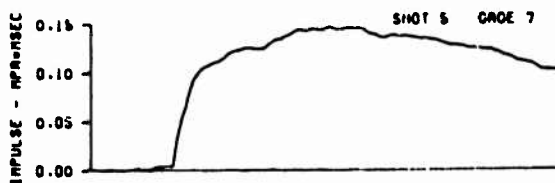
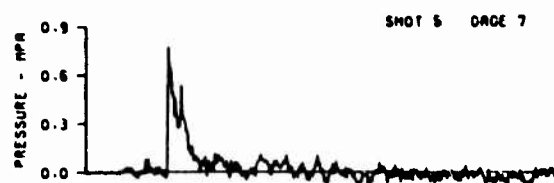
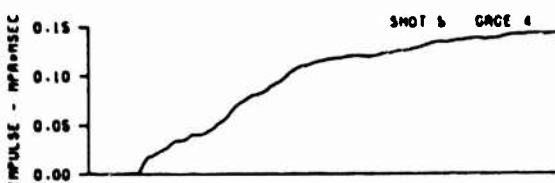
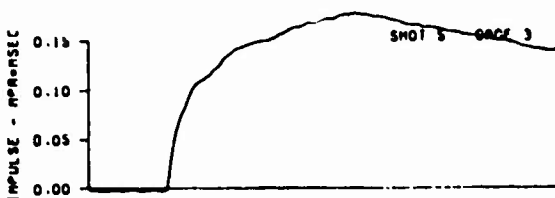
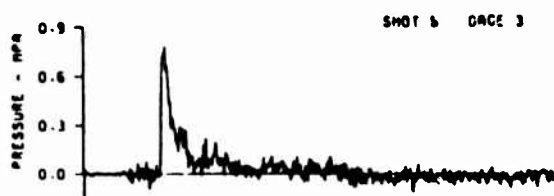
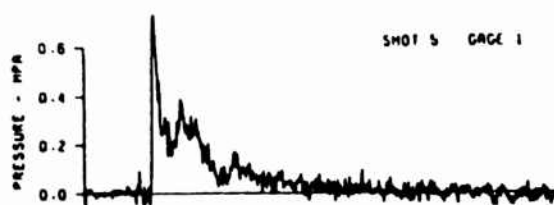


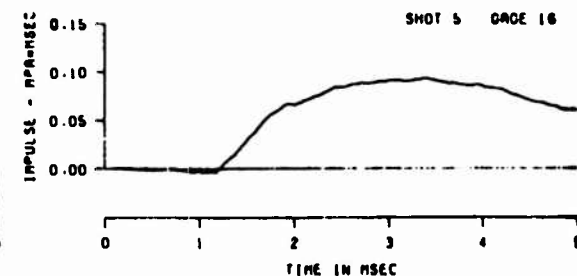
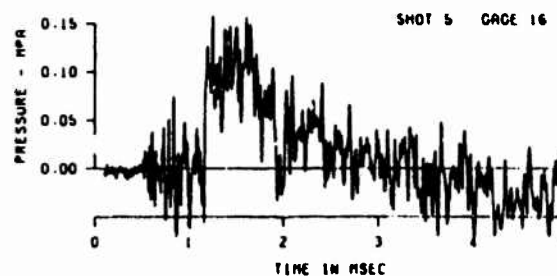
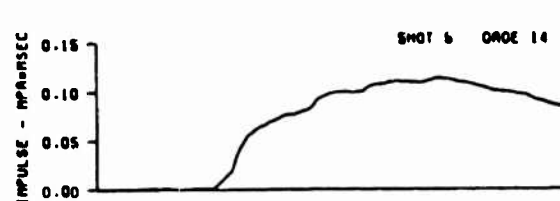
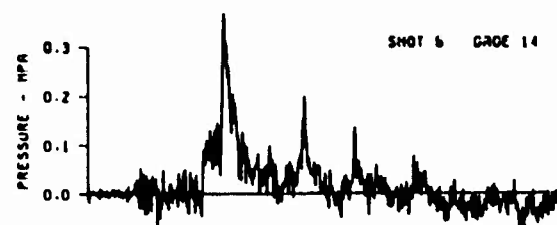
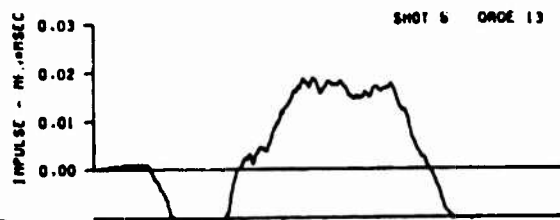
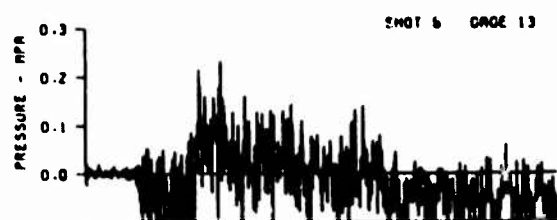
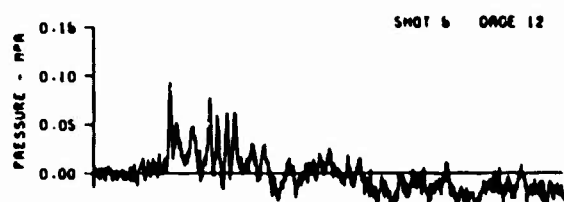
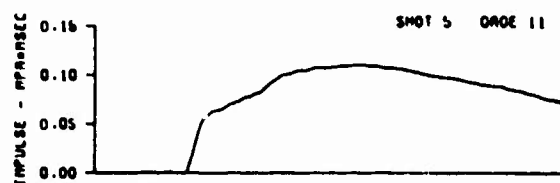
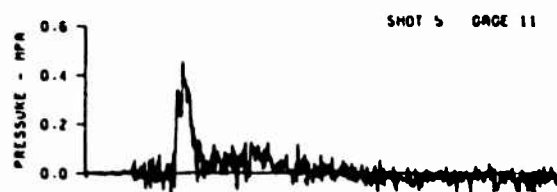


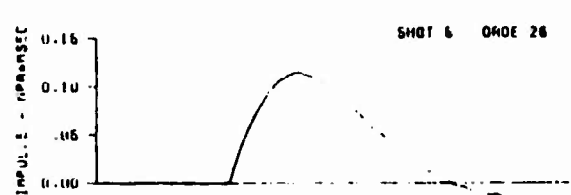
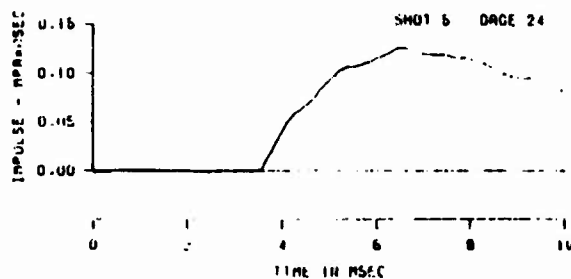
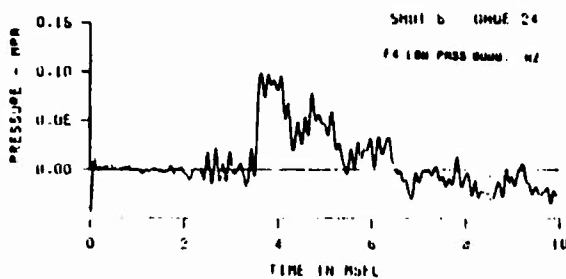
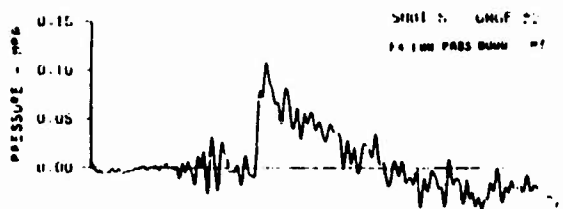
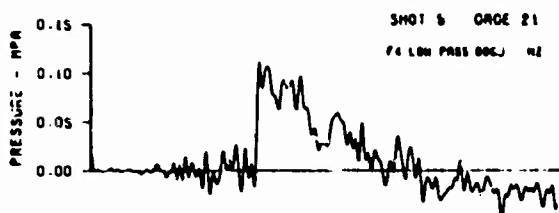
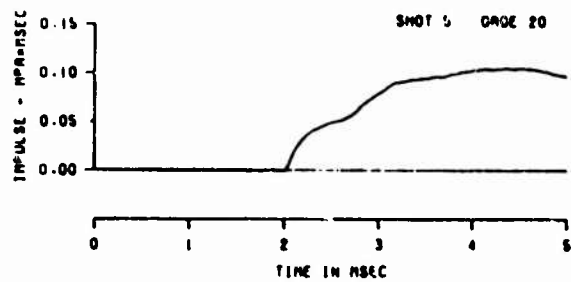
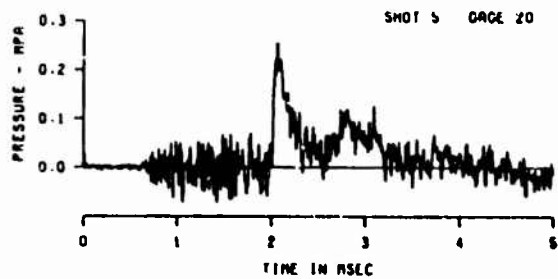


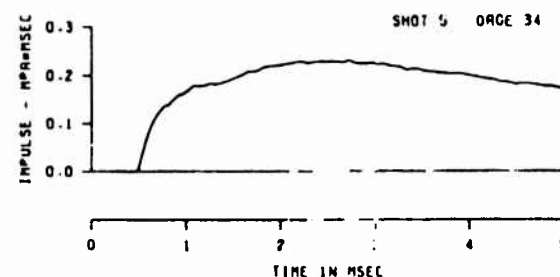
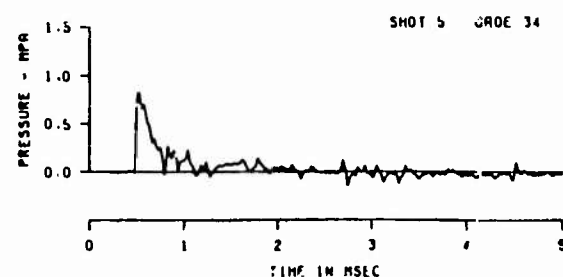
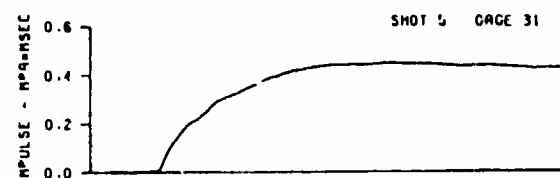
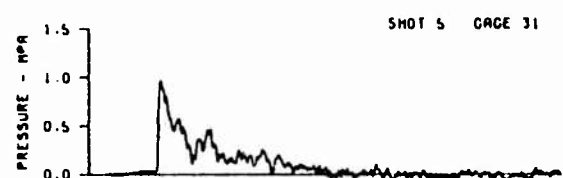
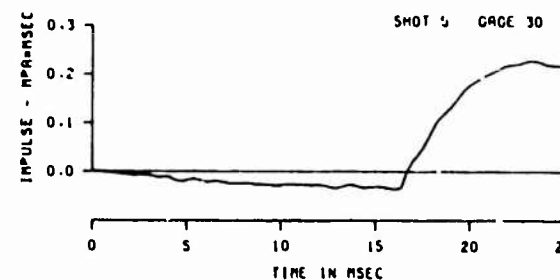
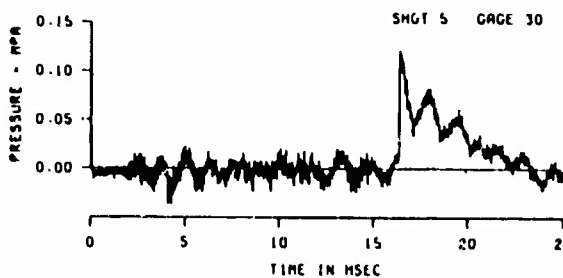
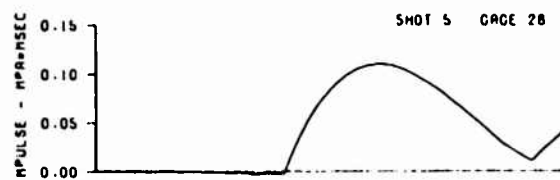
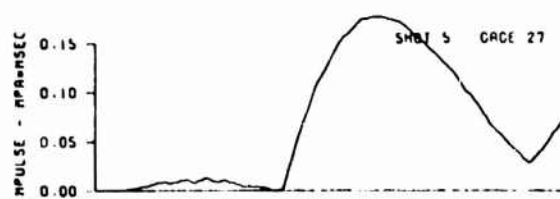
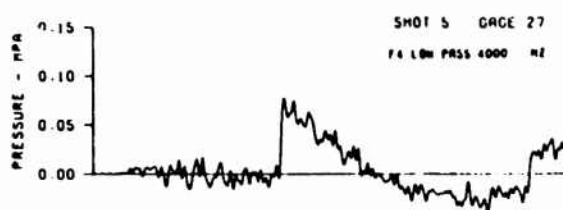




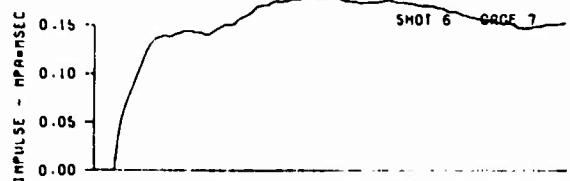
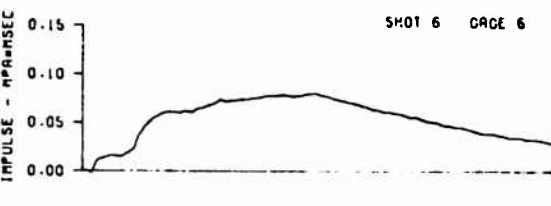
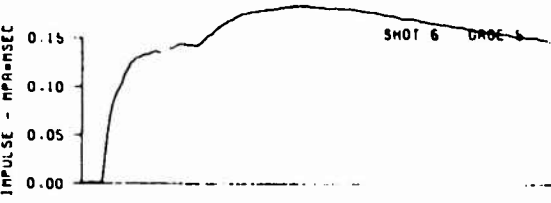
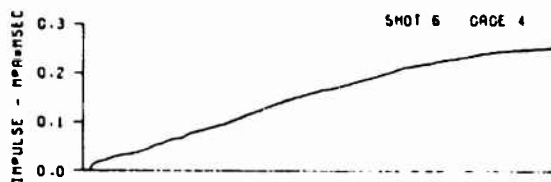
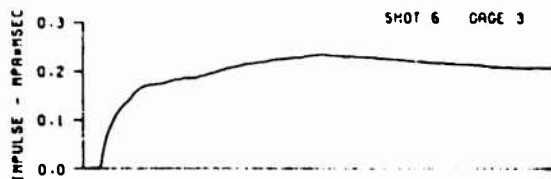
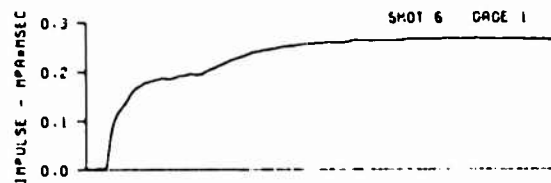






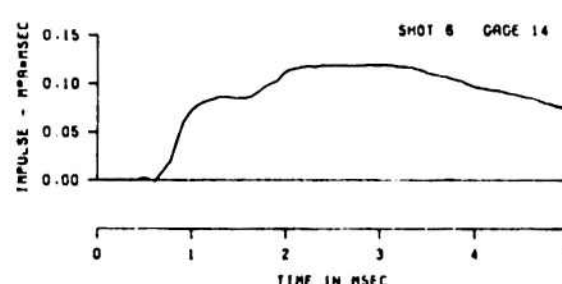
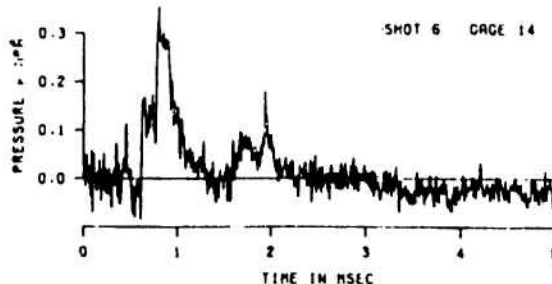
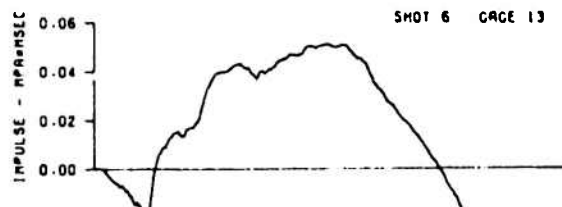
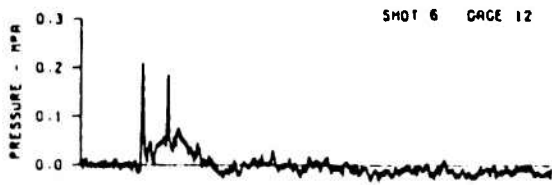
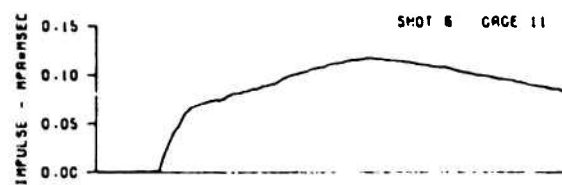
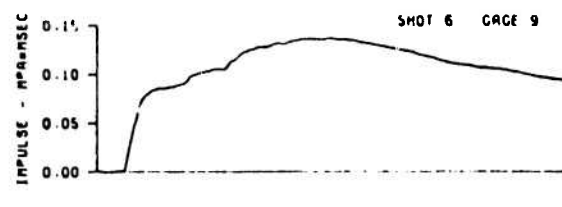
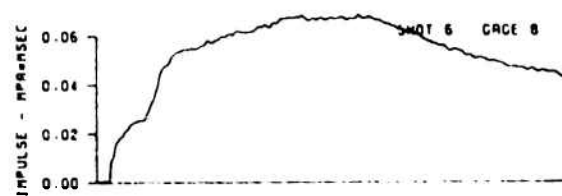


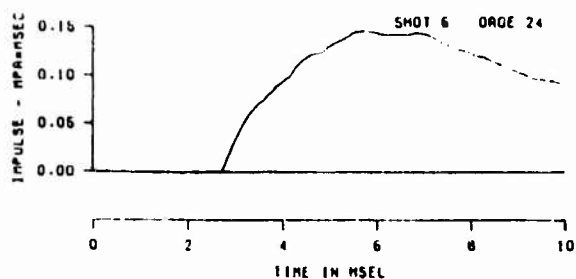
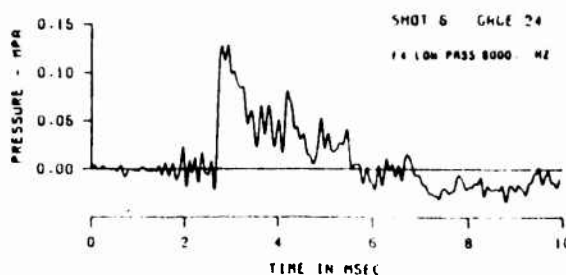
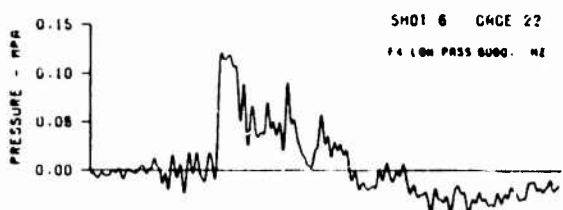
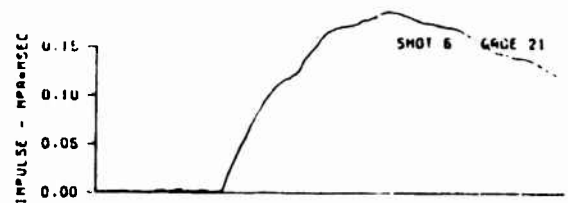
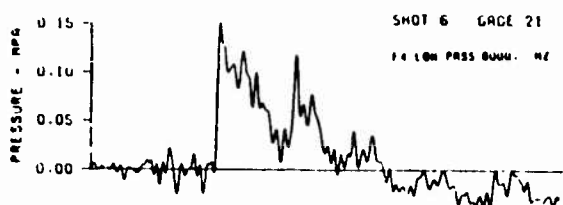
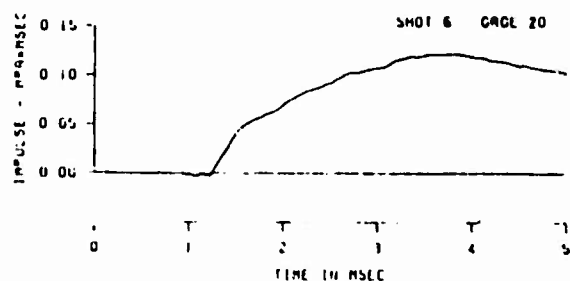
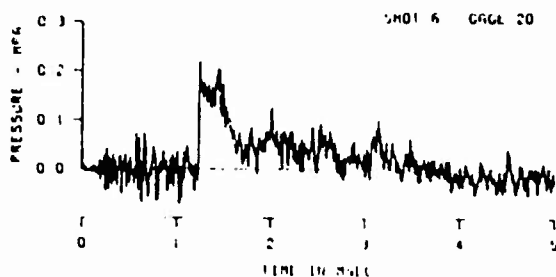
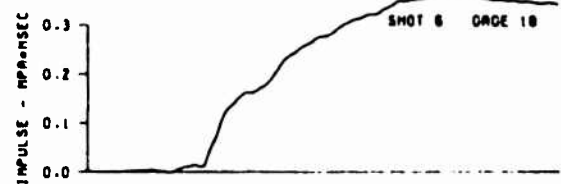
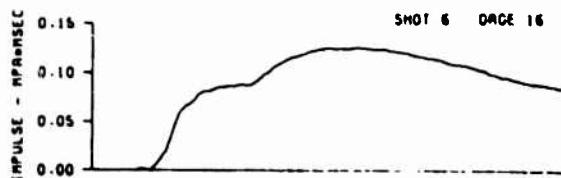


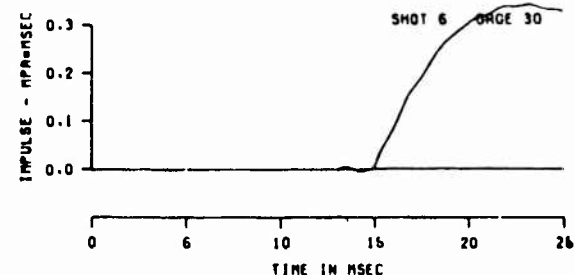
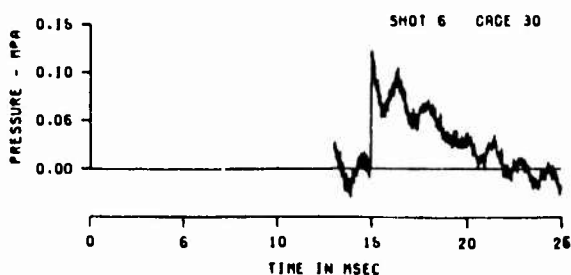
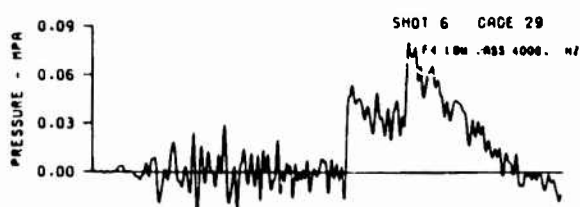
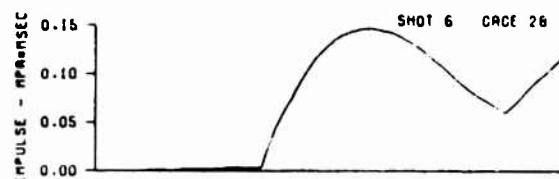
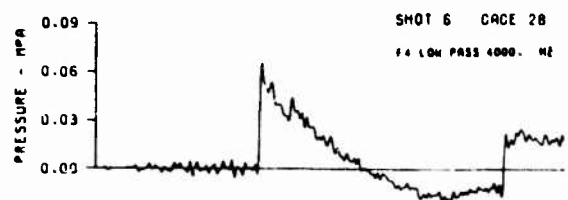
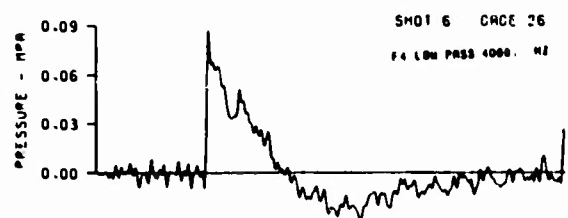
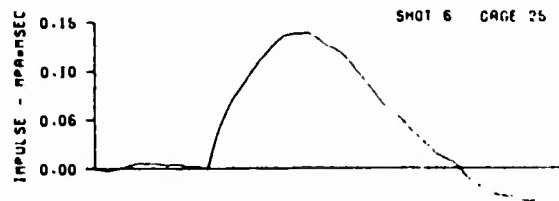
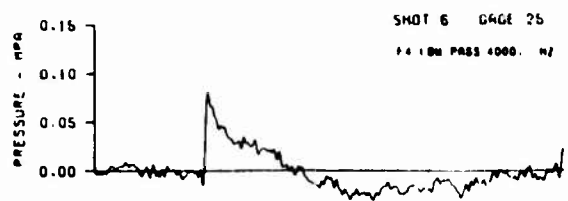


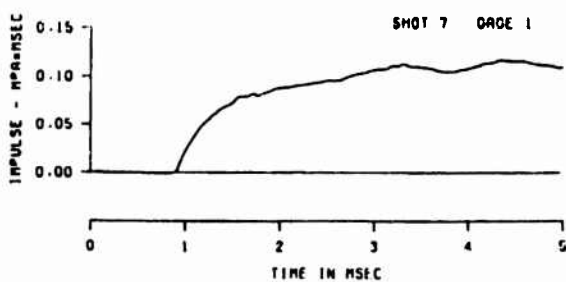
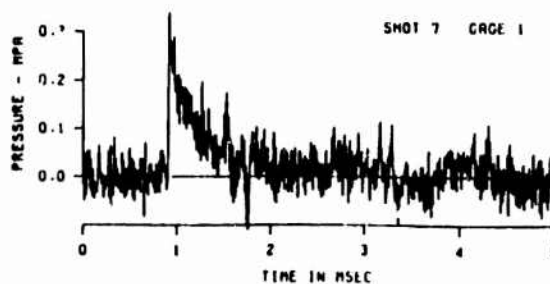
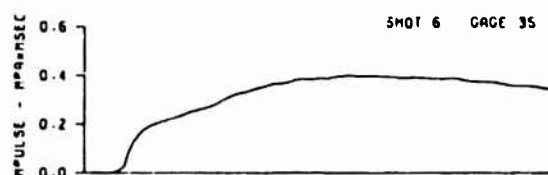
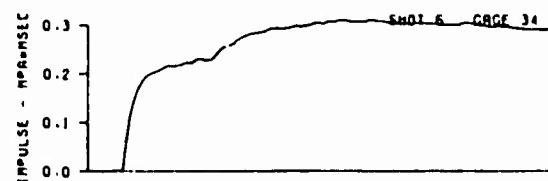
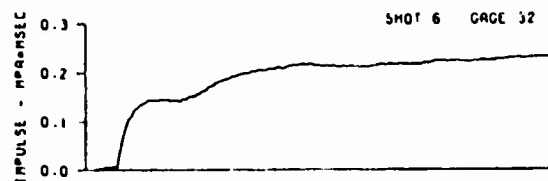
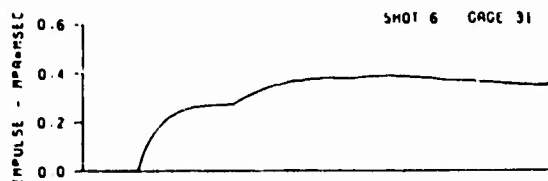
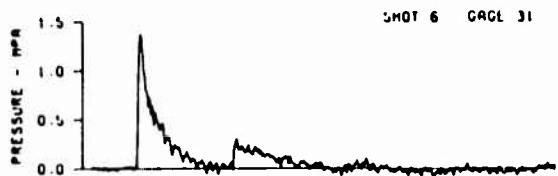
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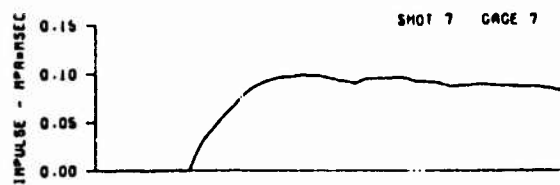
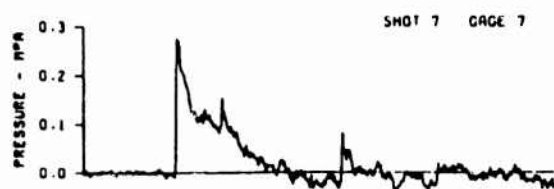
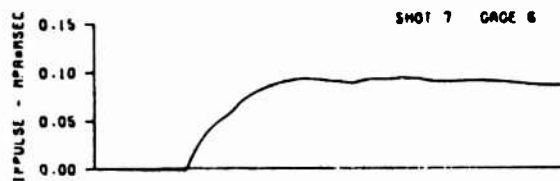
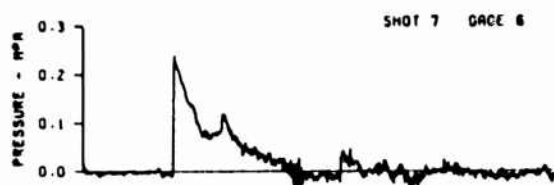
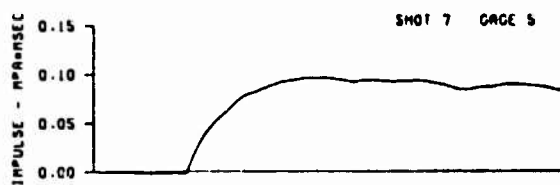
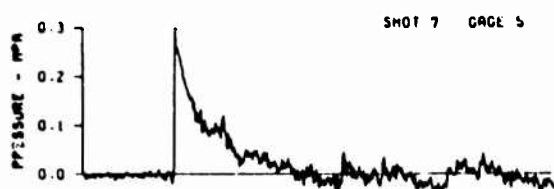
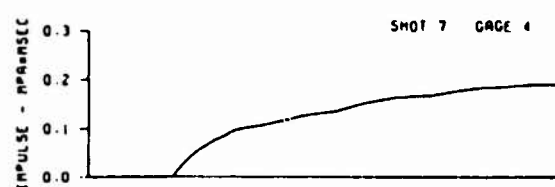
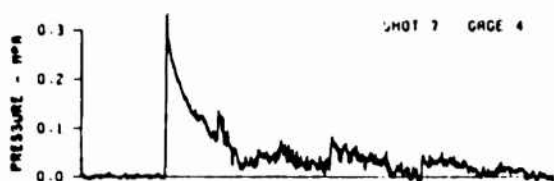
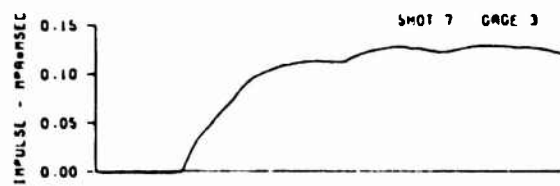
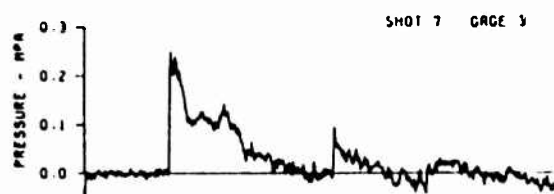
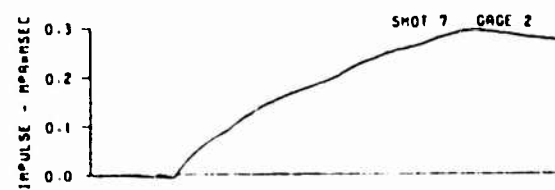
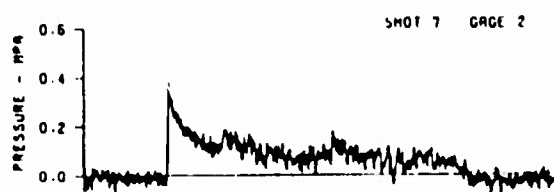
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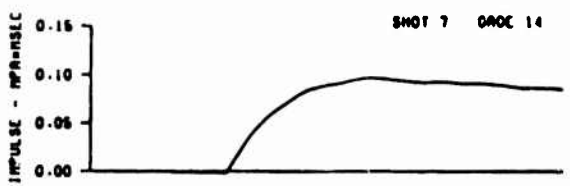
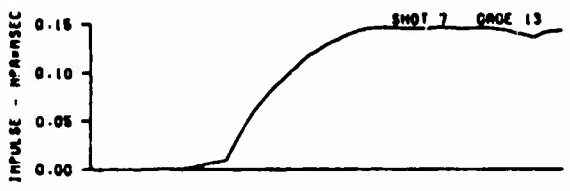
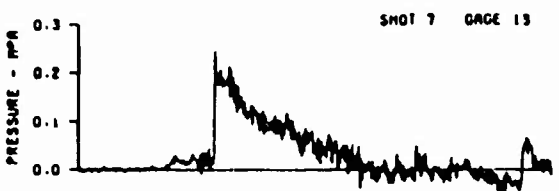
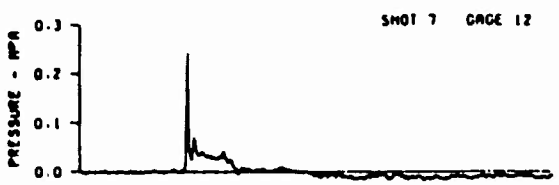
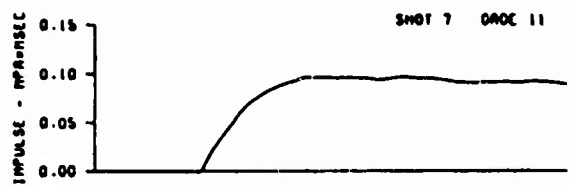
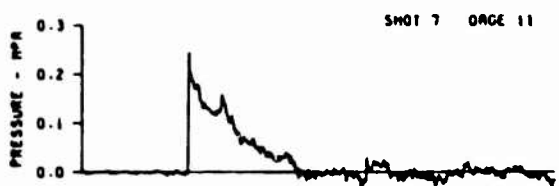
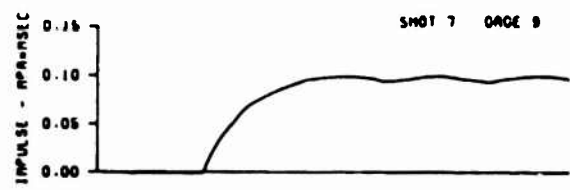
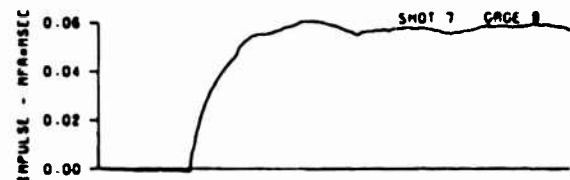
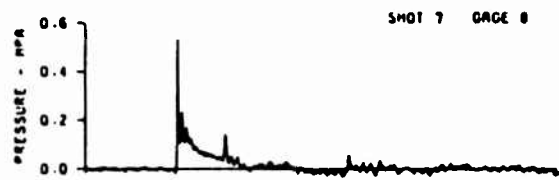


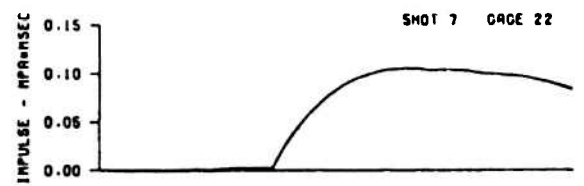
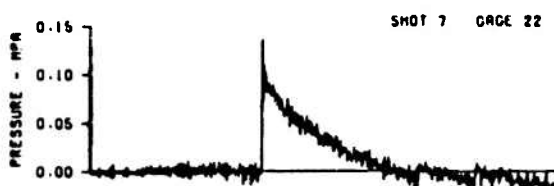
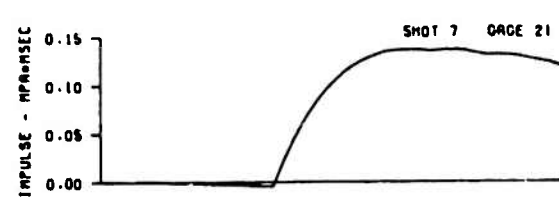
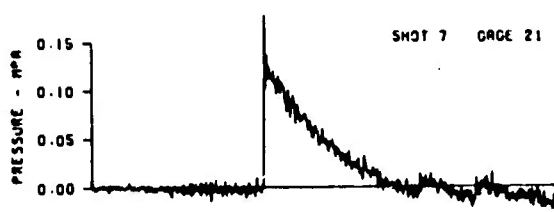
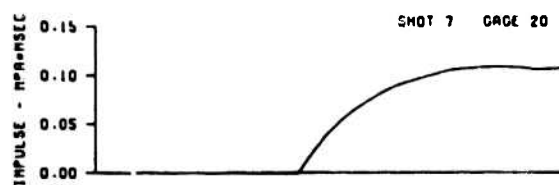
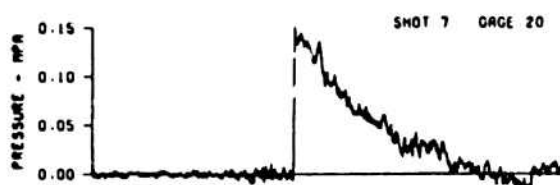
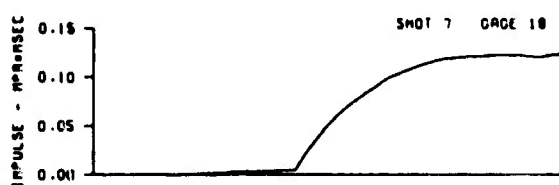
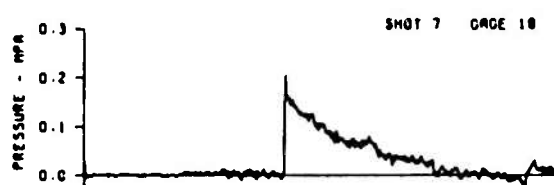
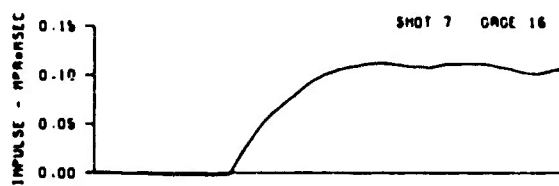
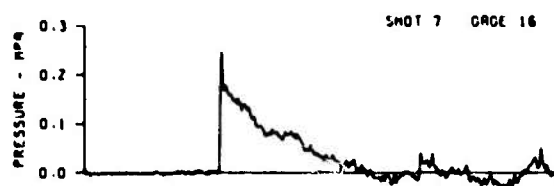
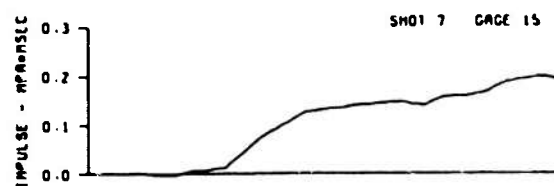
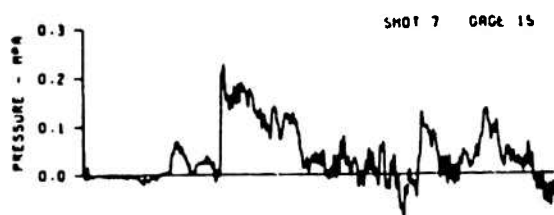




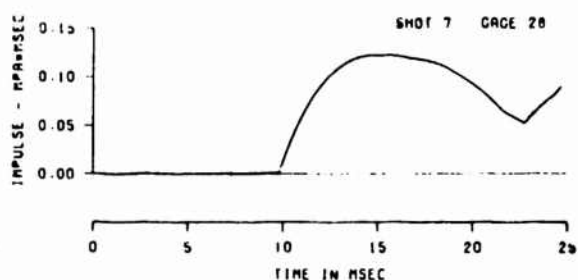
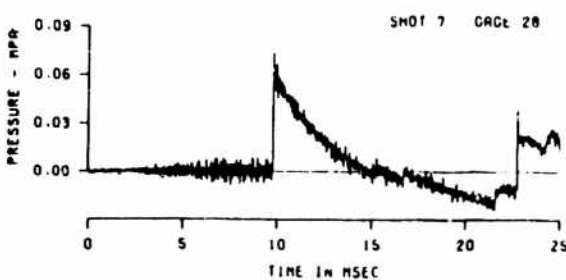
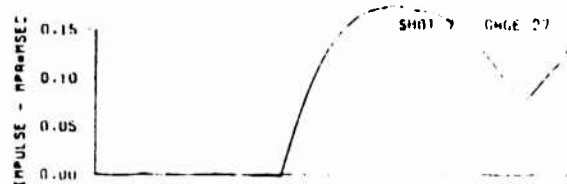
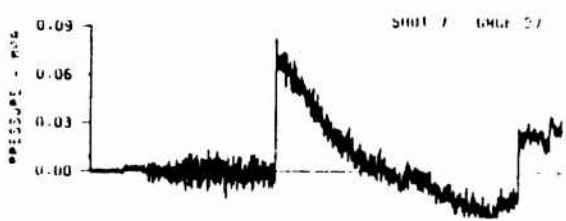
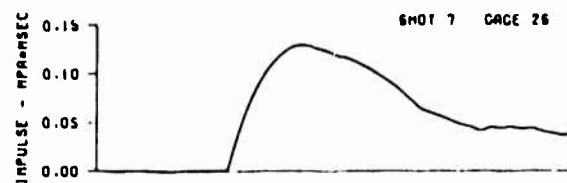
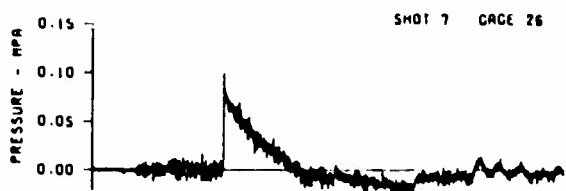
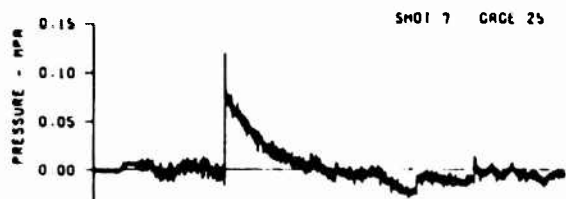
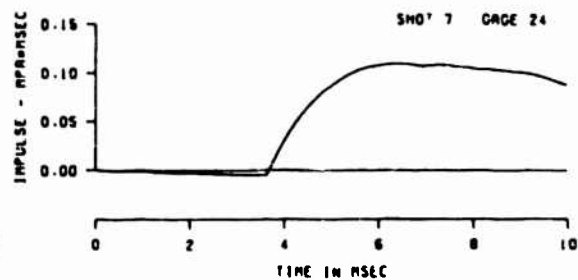
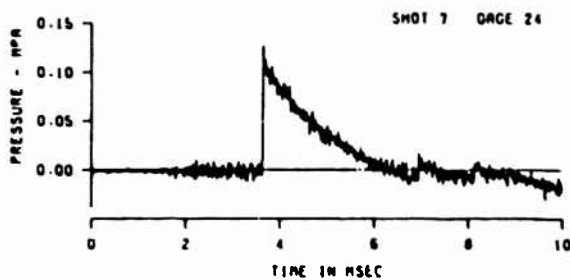
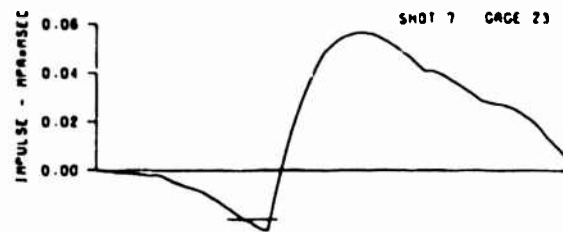


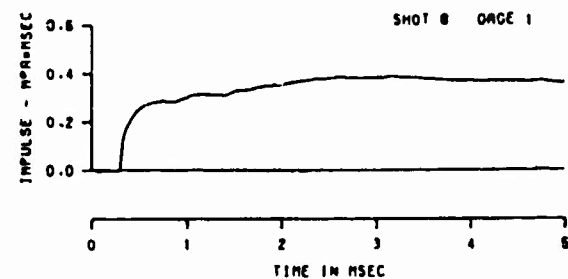
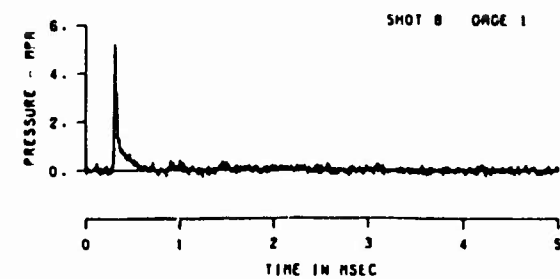
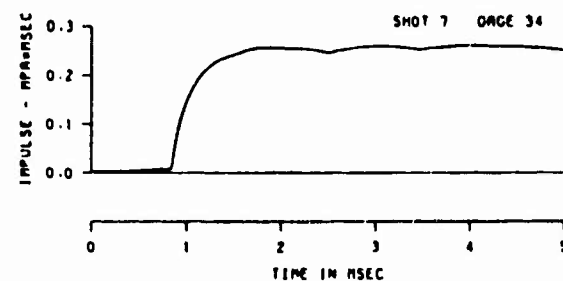
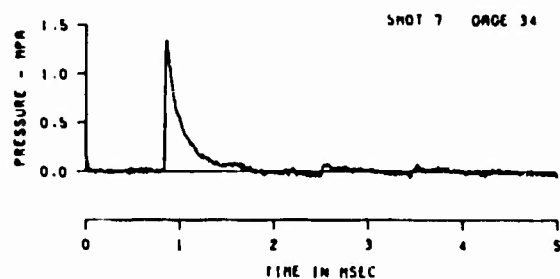
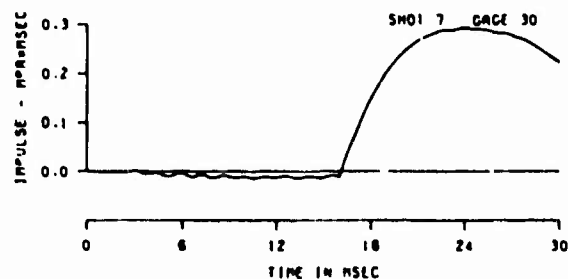
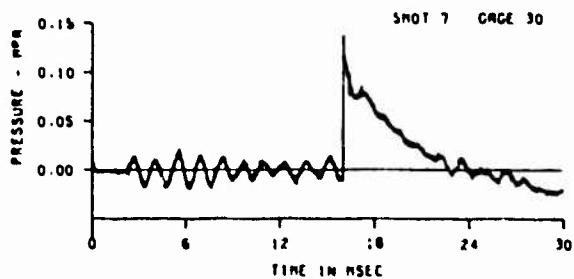
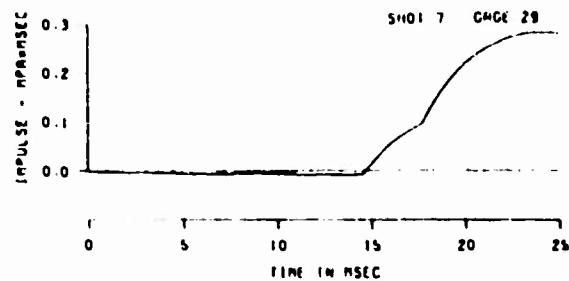
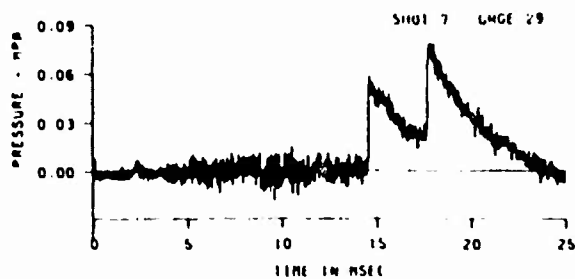


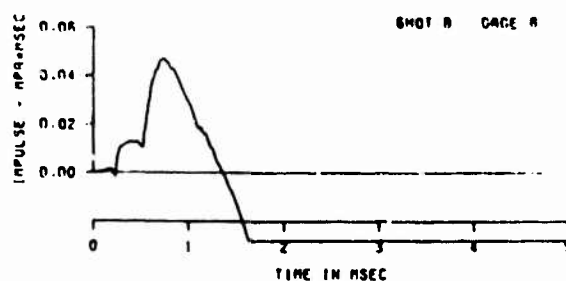
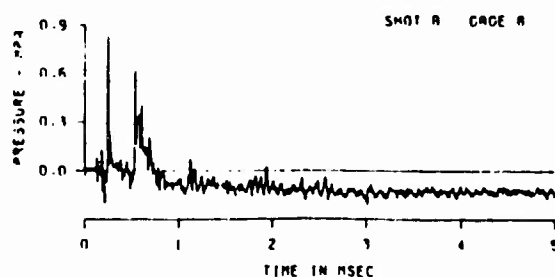
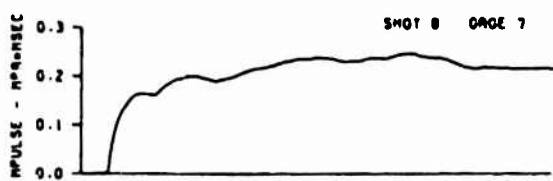
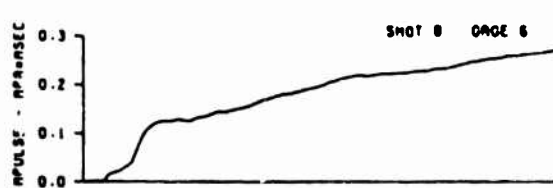
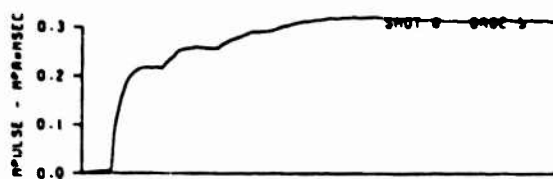
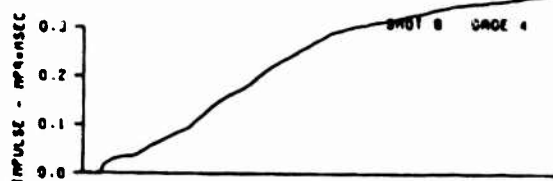
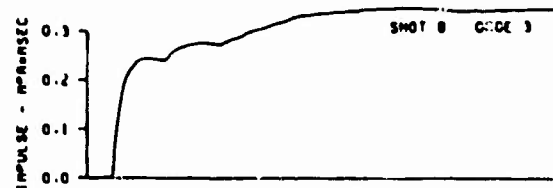


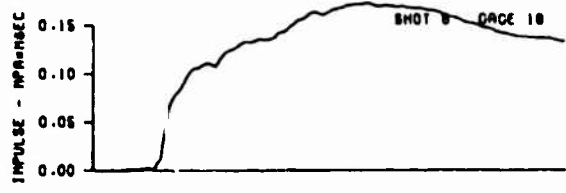
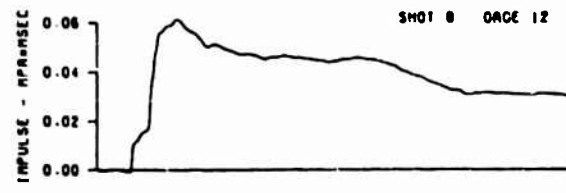
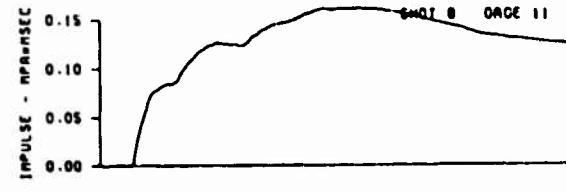


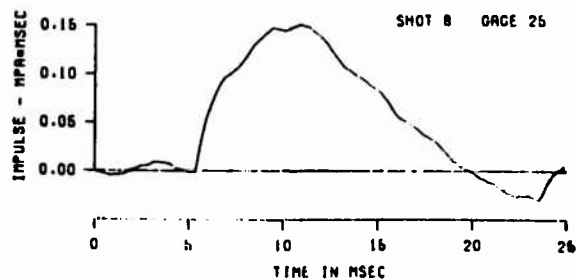
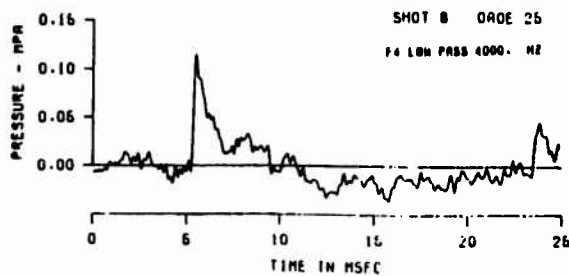
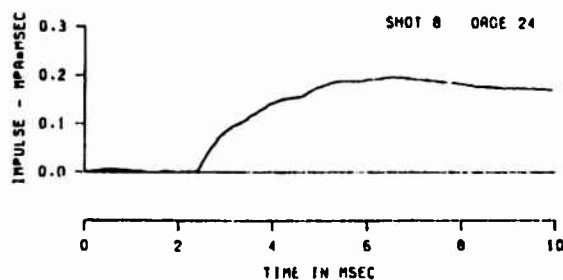
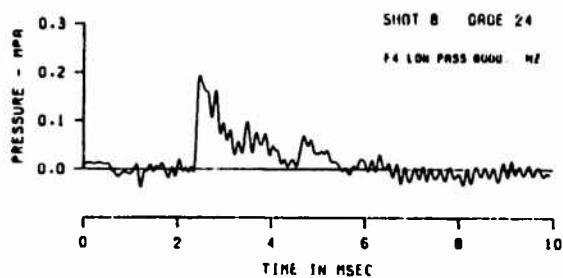
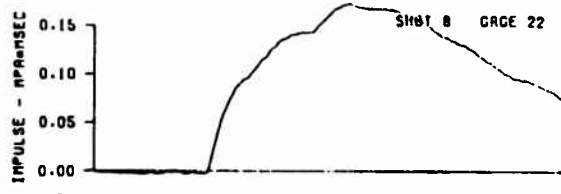
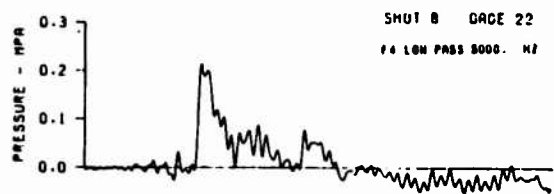
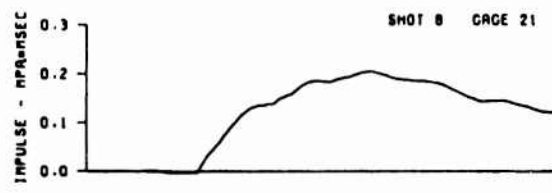
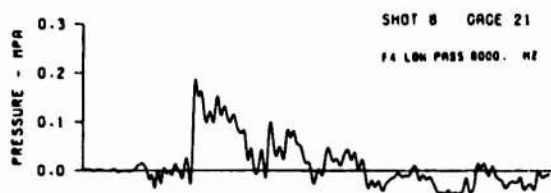
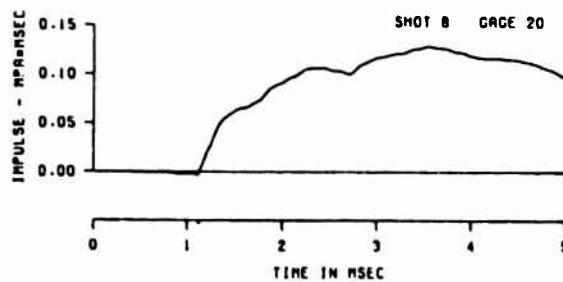
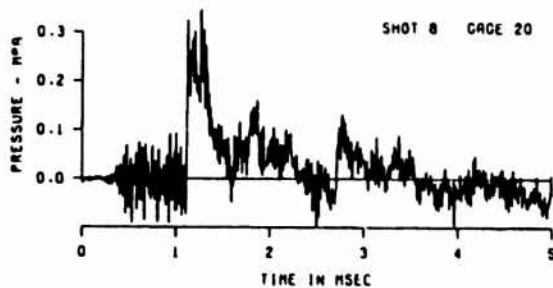


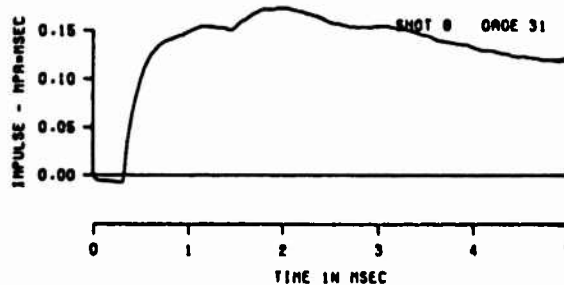
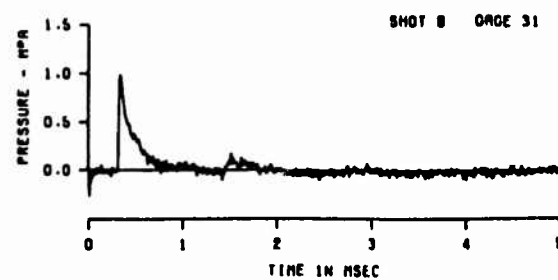
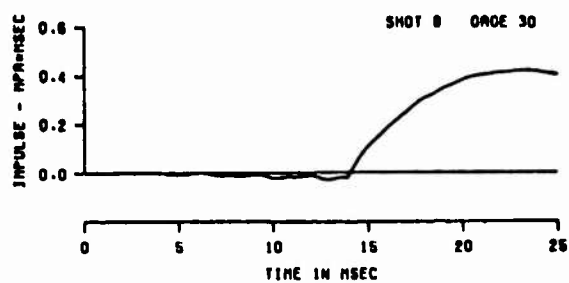
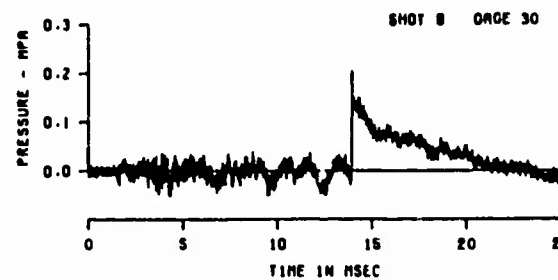
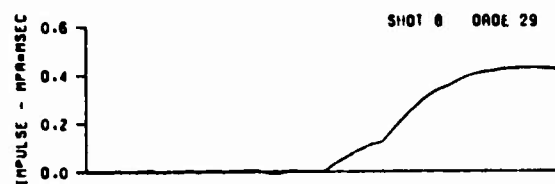
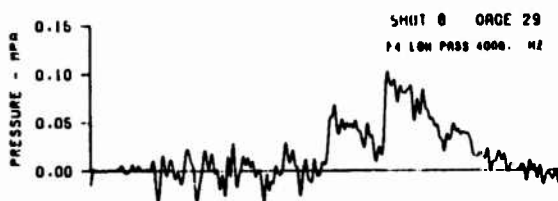
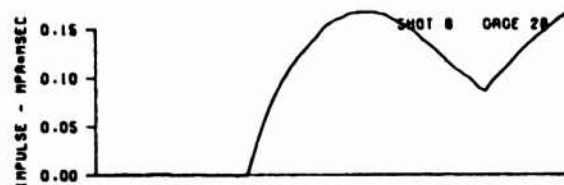
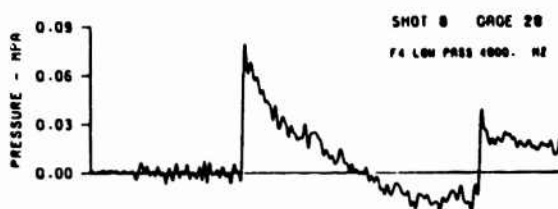
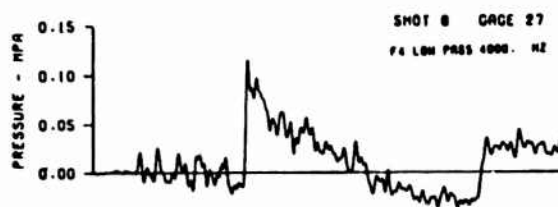
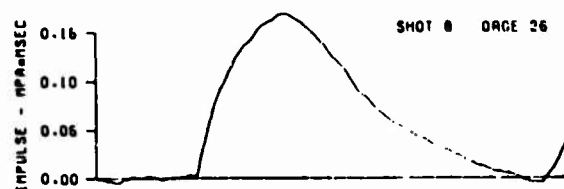
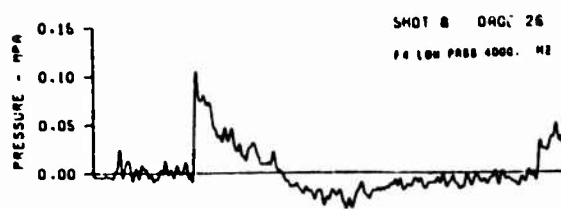


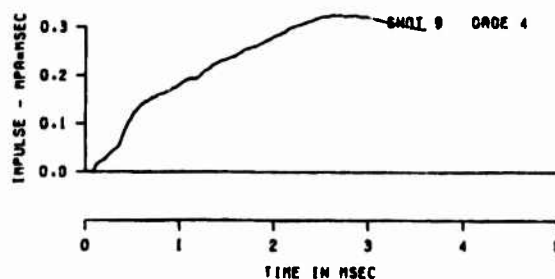
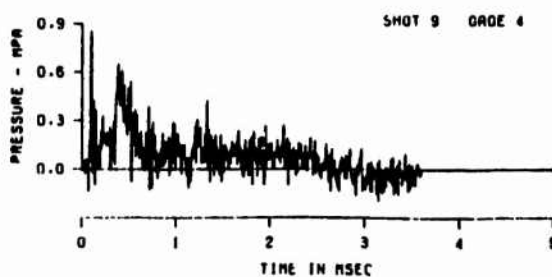
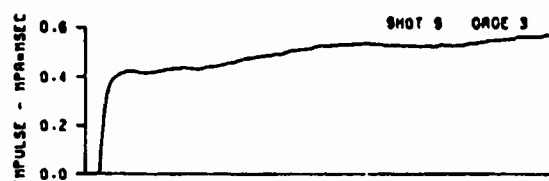
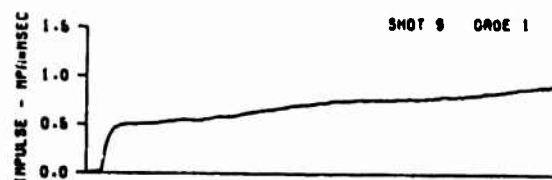
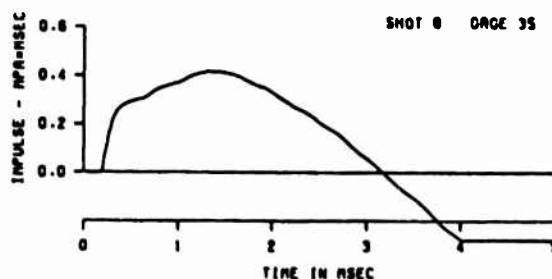
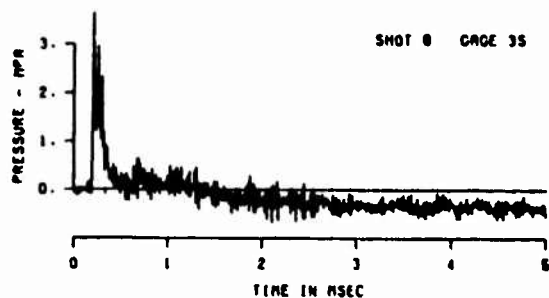
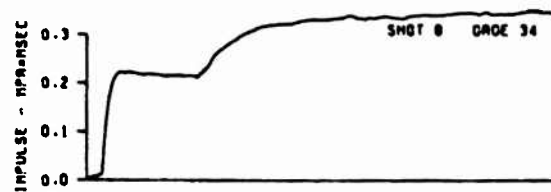


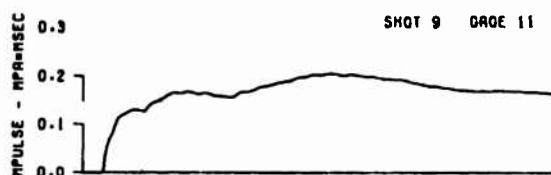
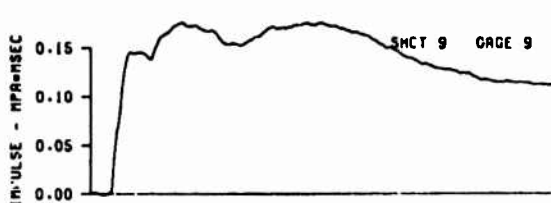
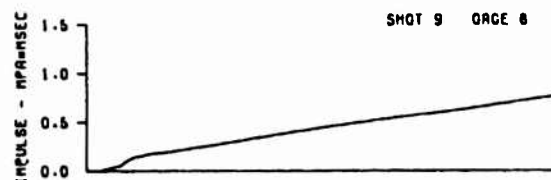
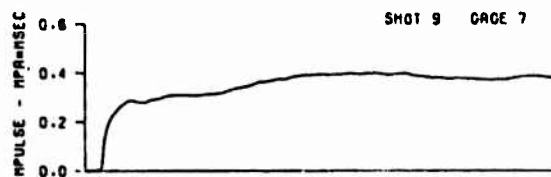
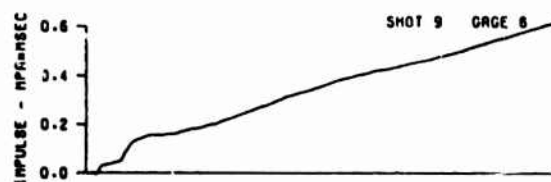
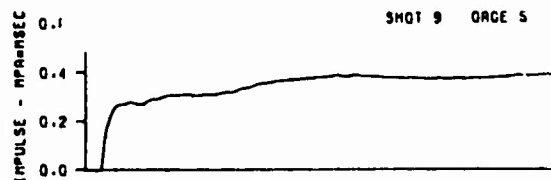




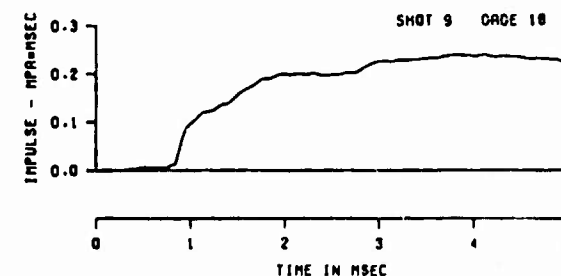
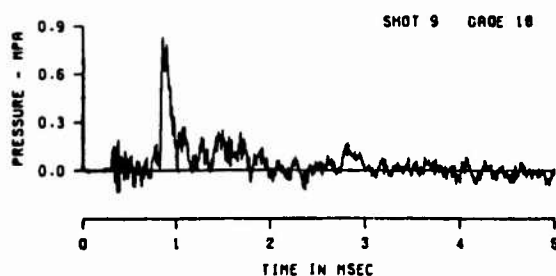
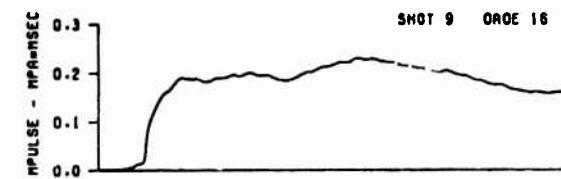
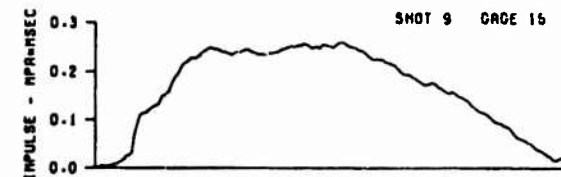
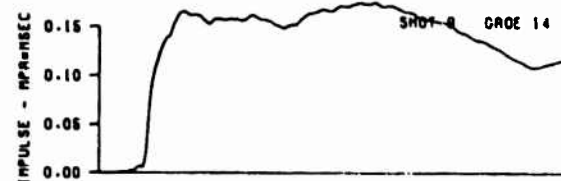
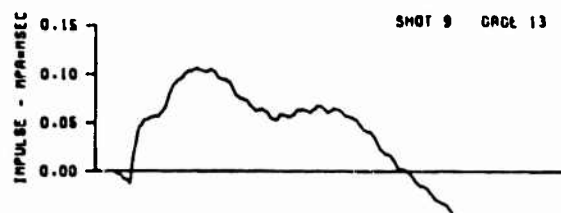
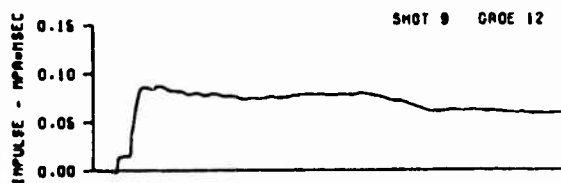


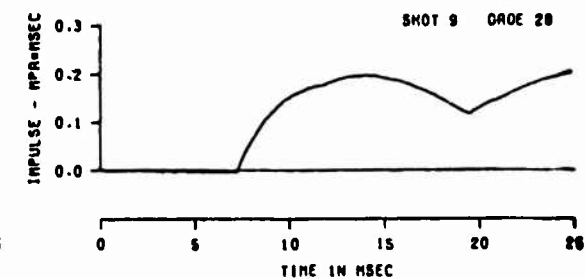
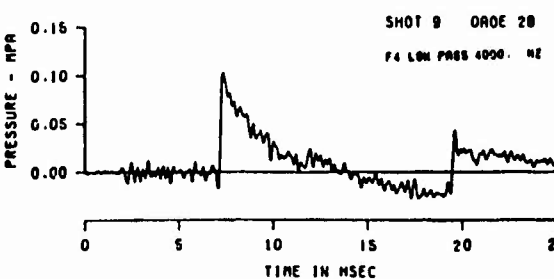
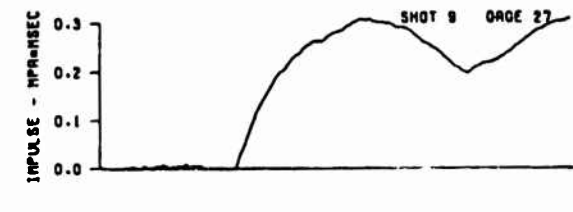
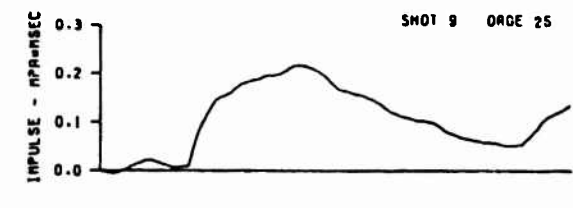
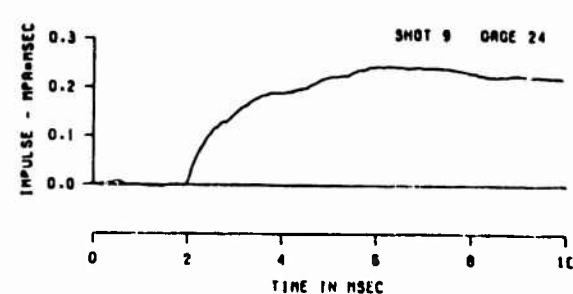
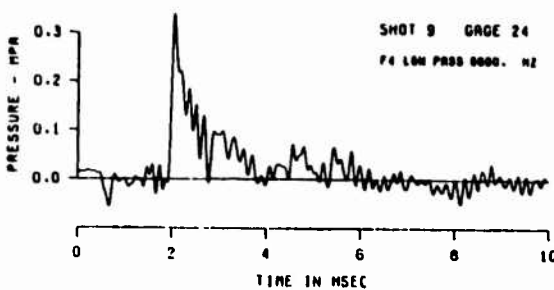
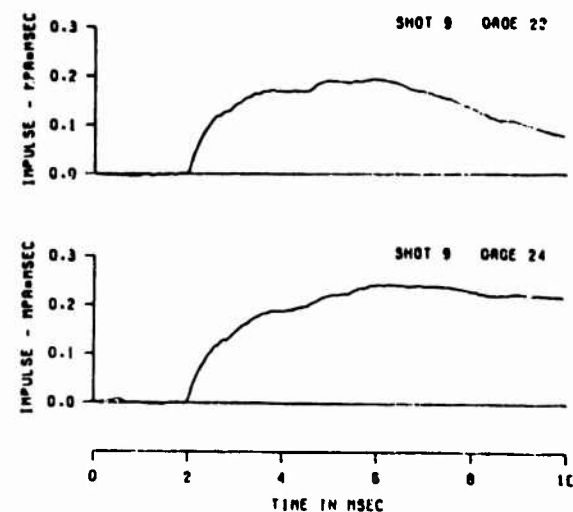
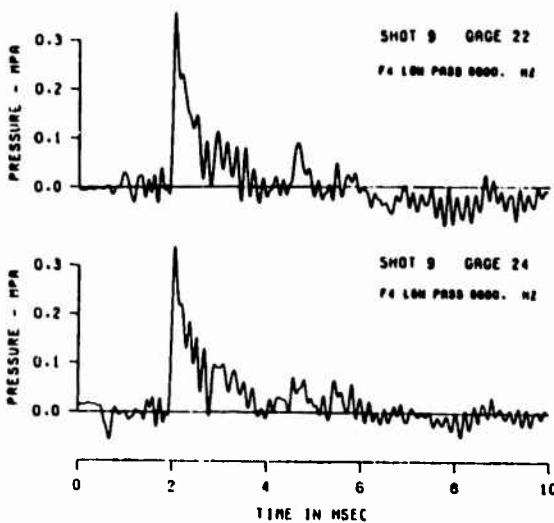
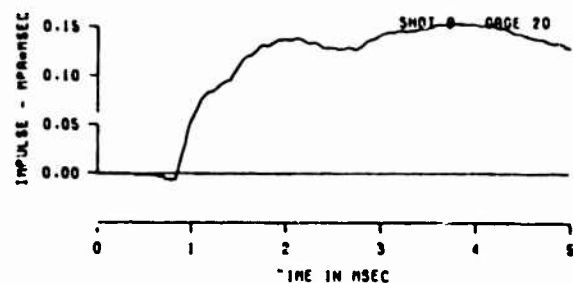
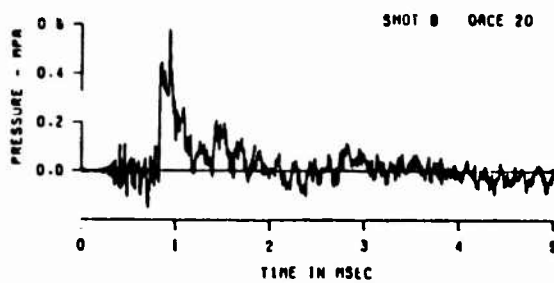


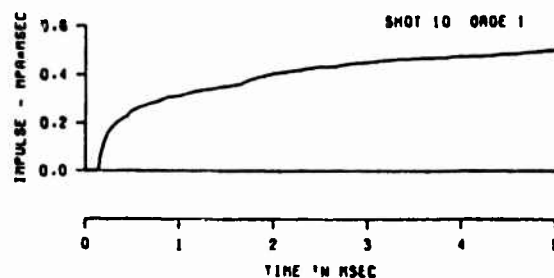
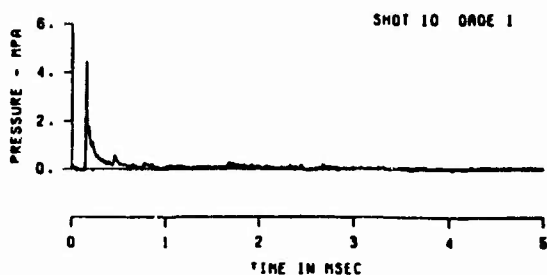
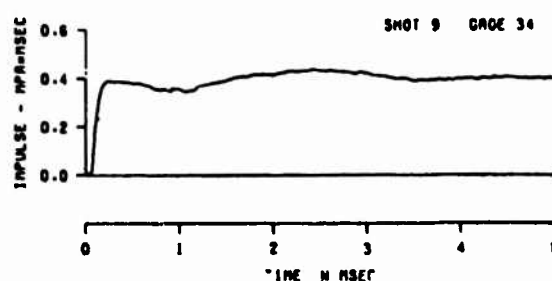
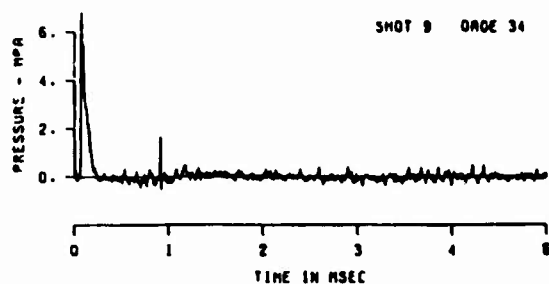
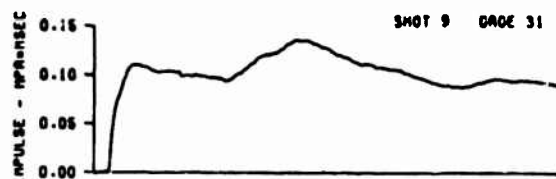
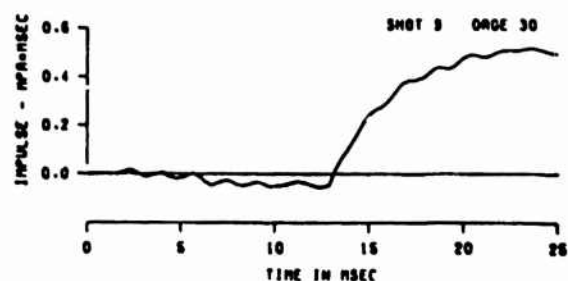
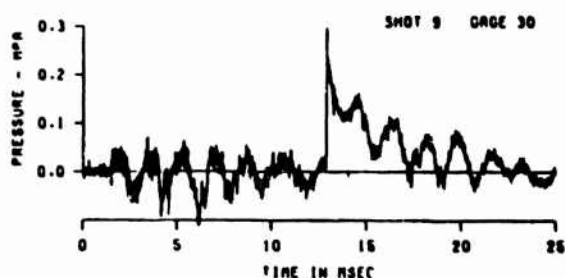
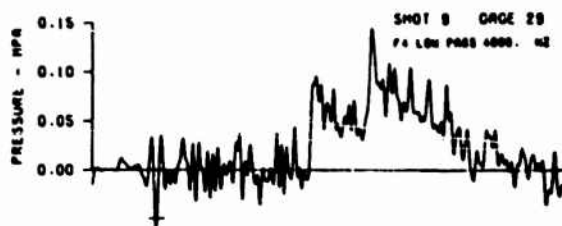


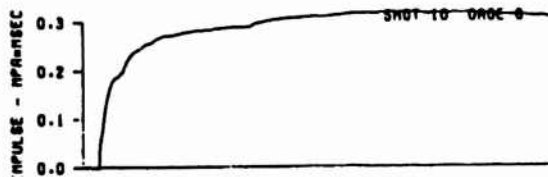
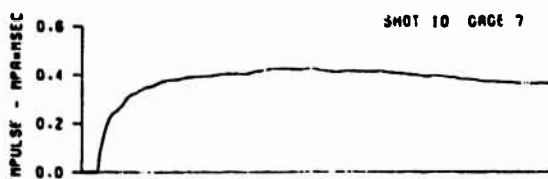
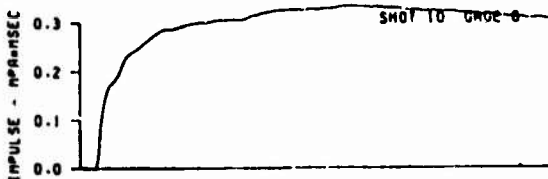
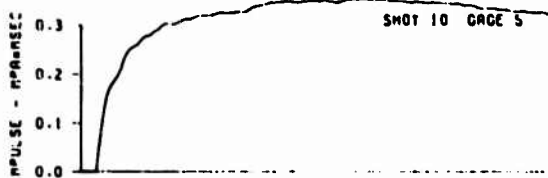
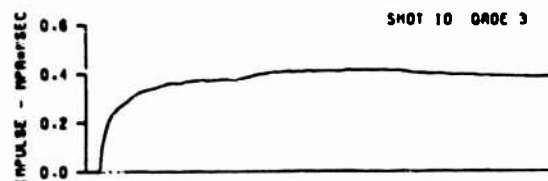


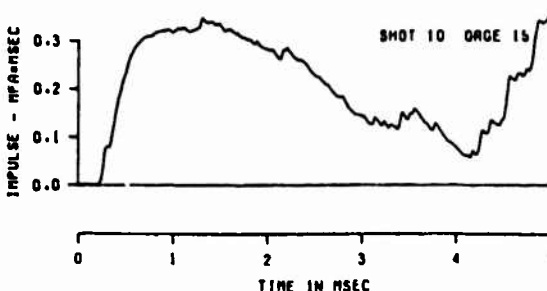
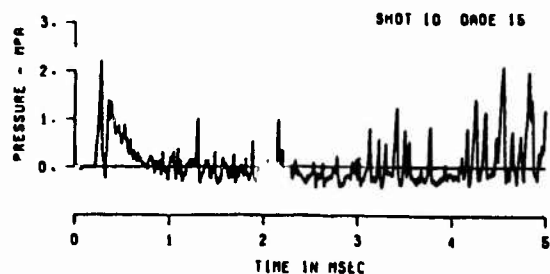
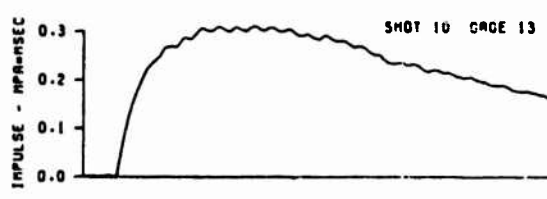
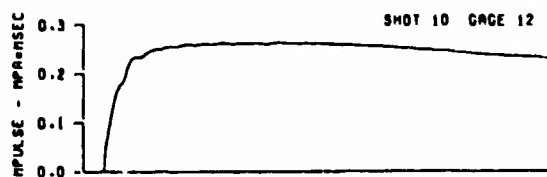
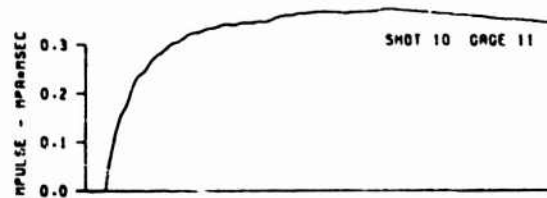
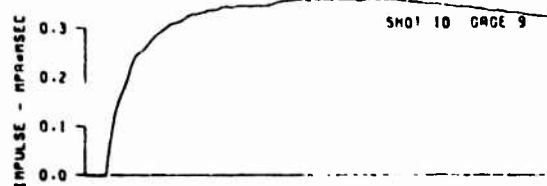


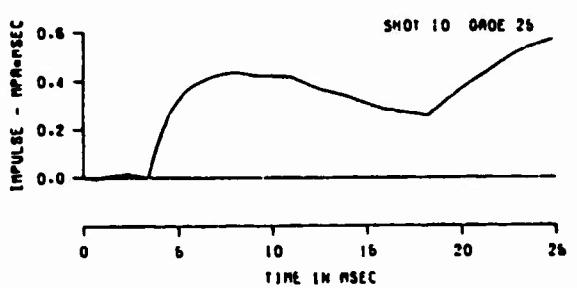
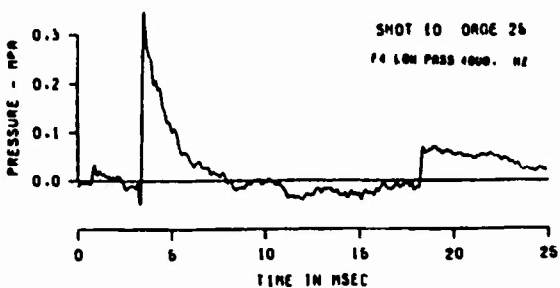
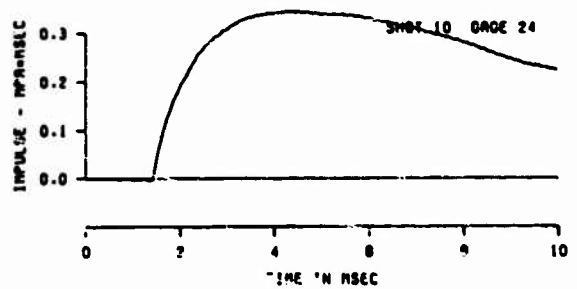
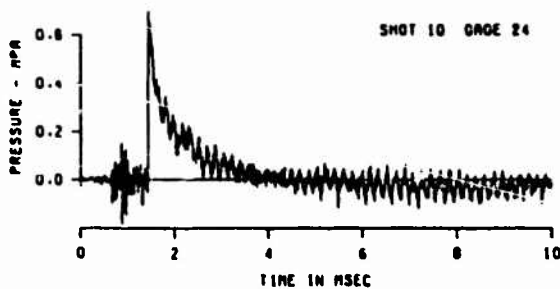
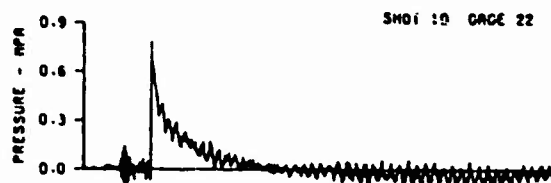
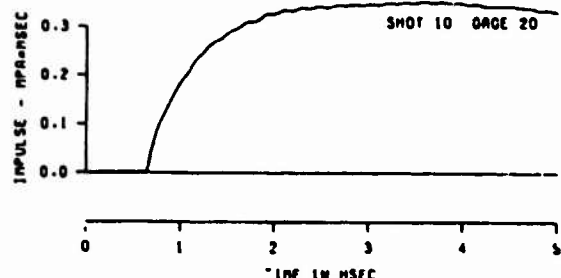
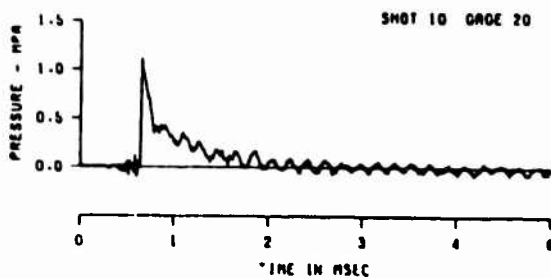
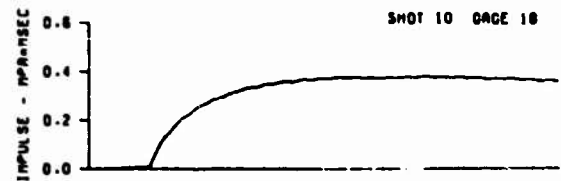
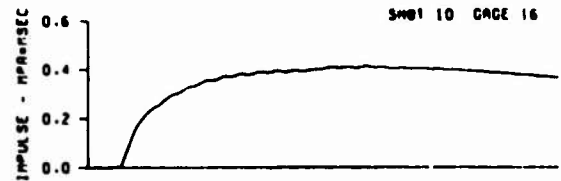


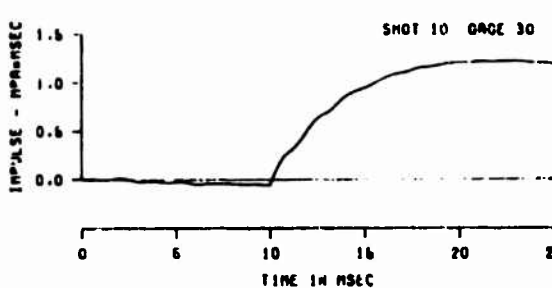
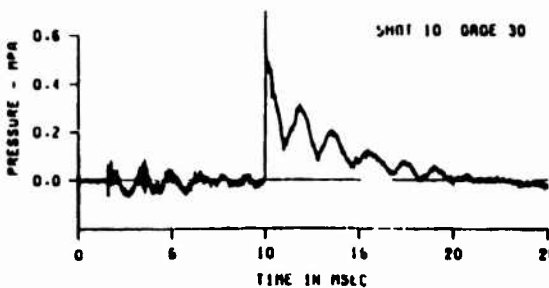
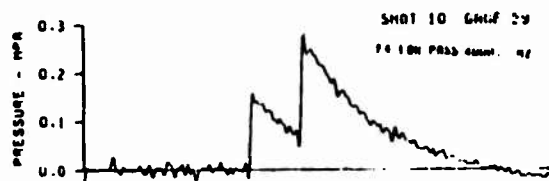
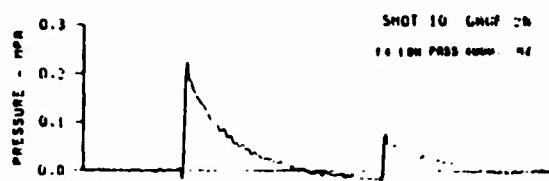
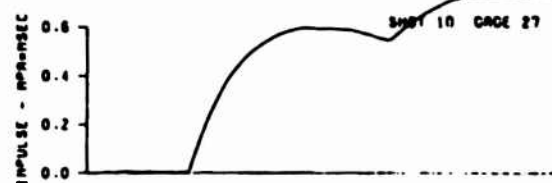
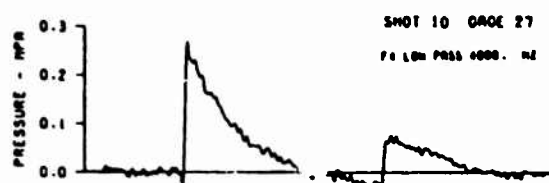
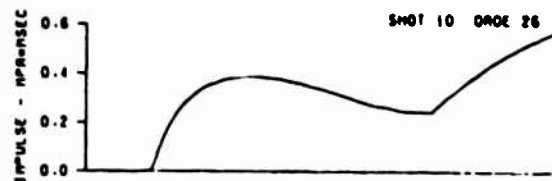
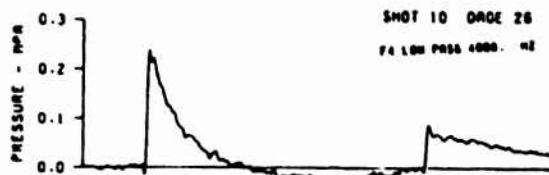


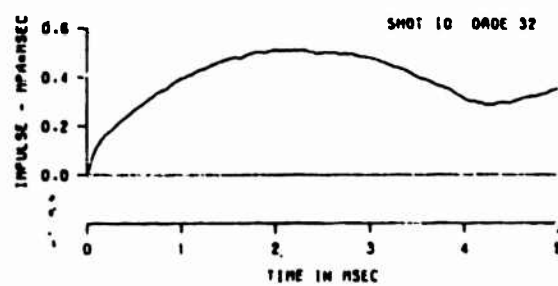
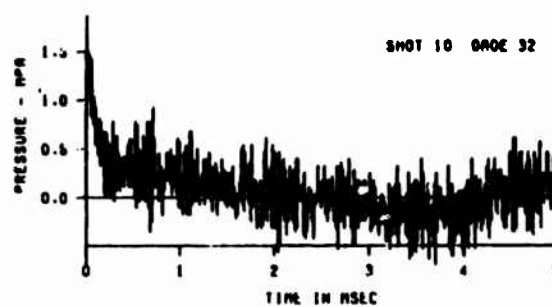
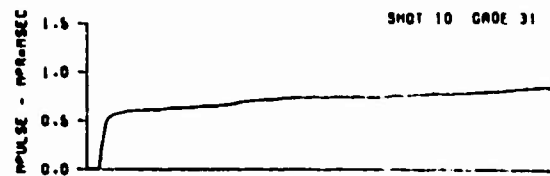








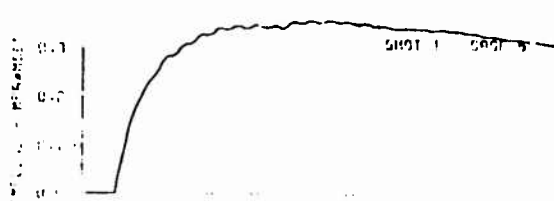
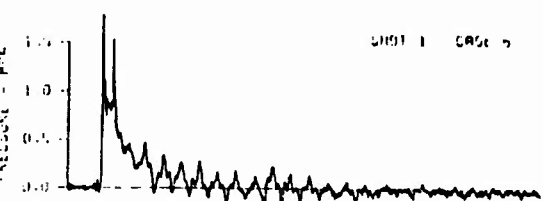
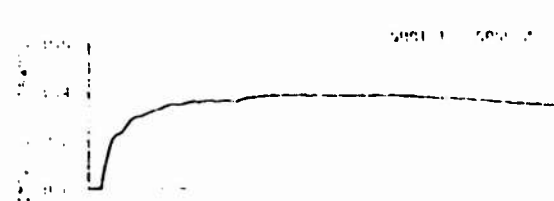
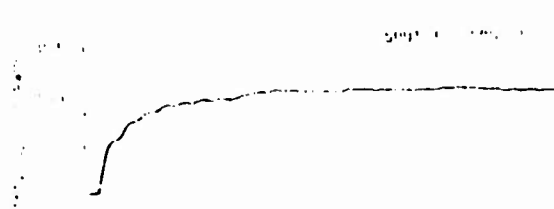






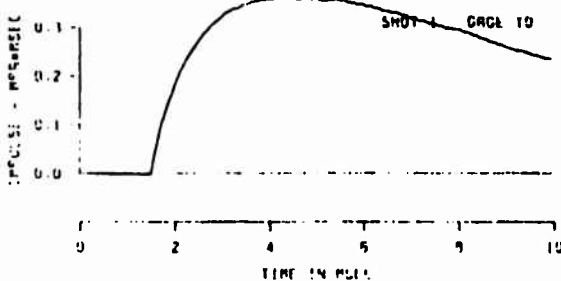
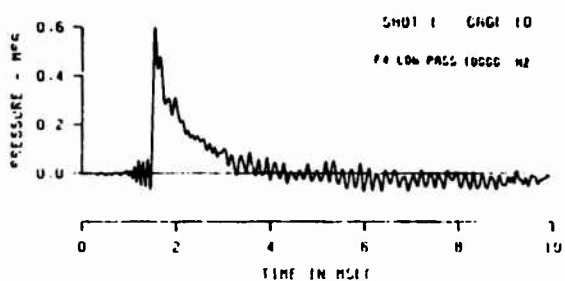
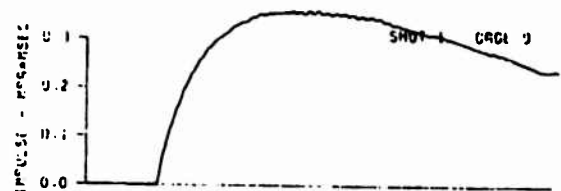
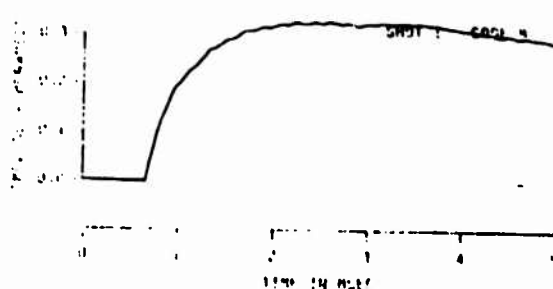
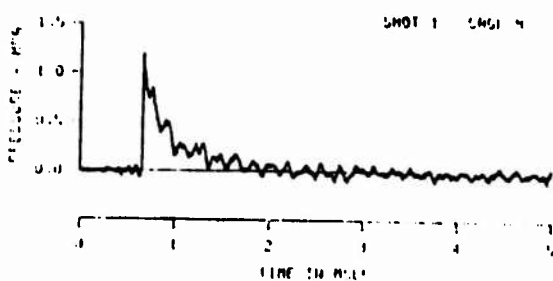
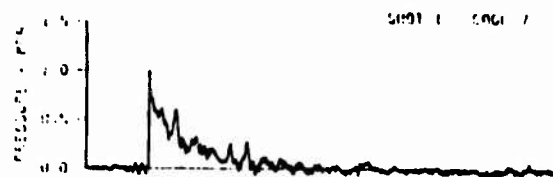
APPENDIX B

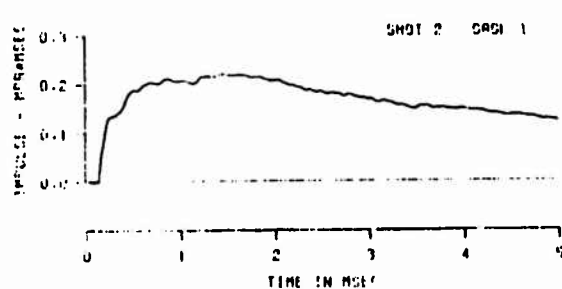
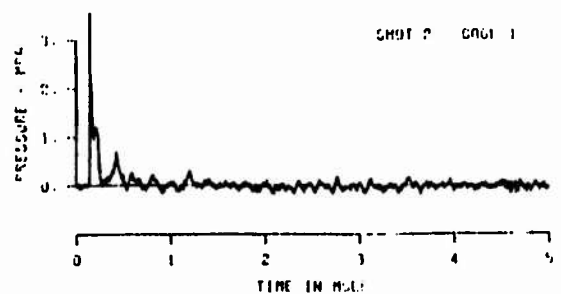
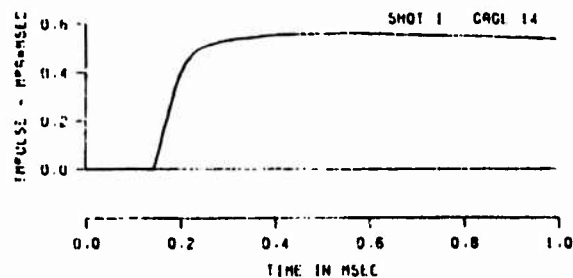
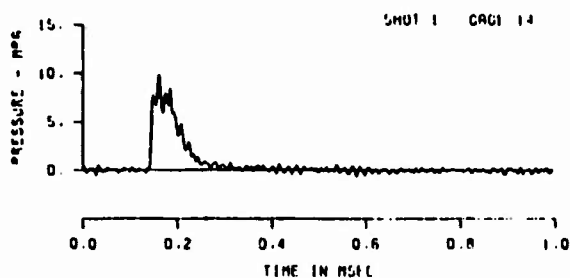
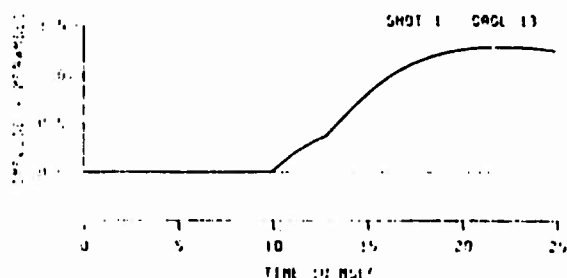
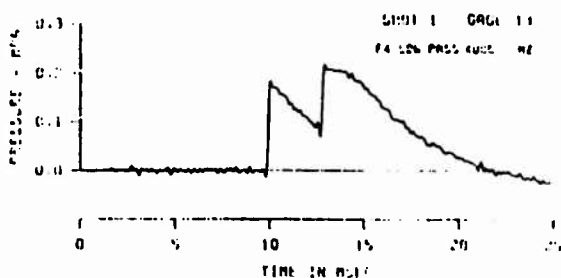
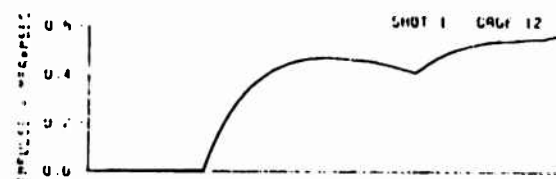
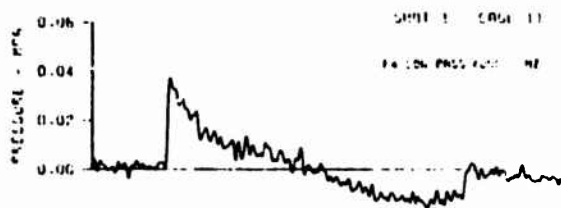
AIRBLAST MEASUREMENTS 1982 SERIES

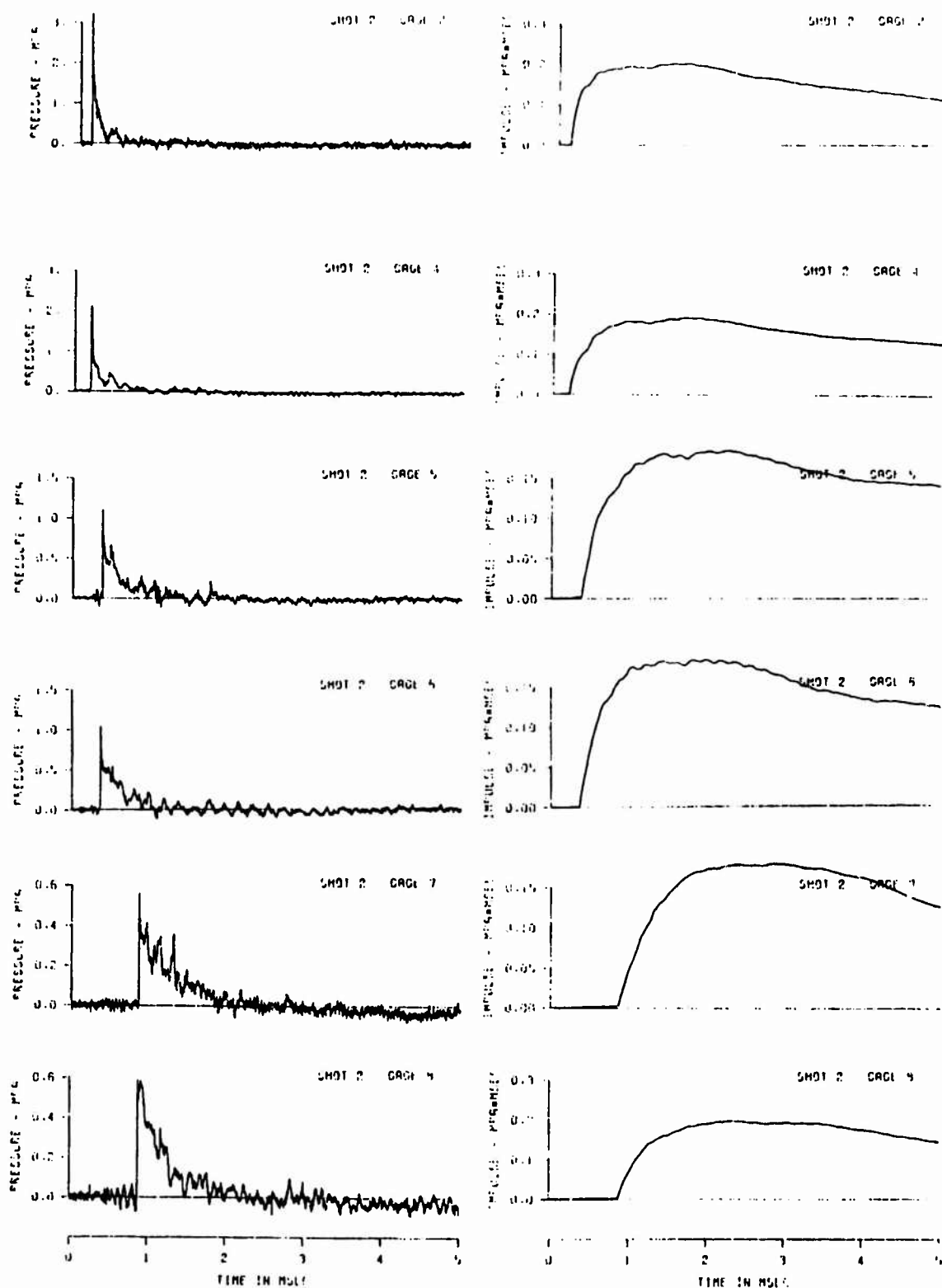


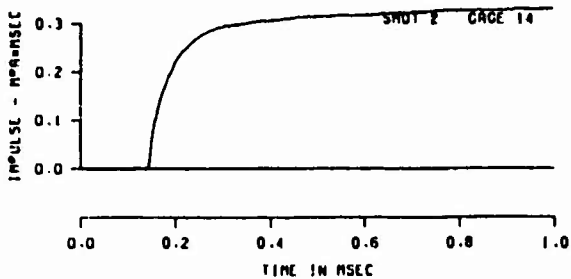
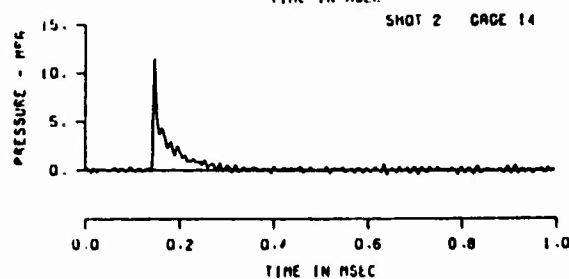
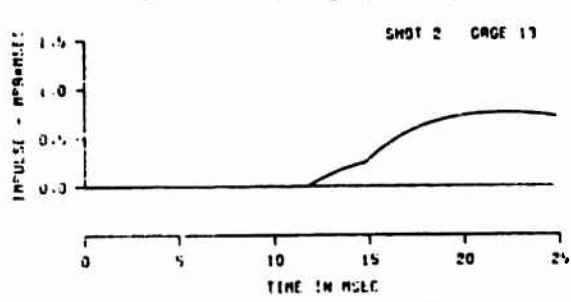
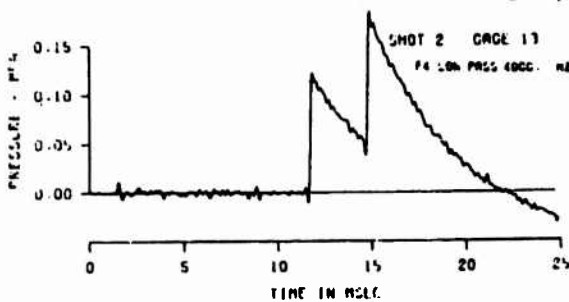
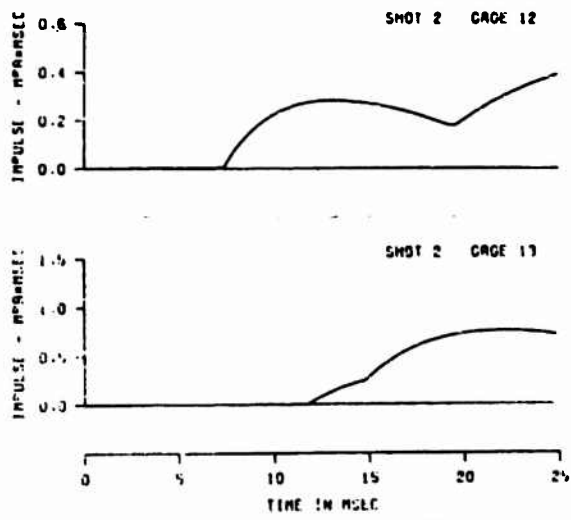
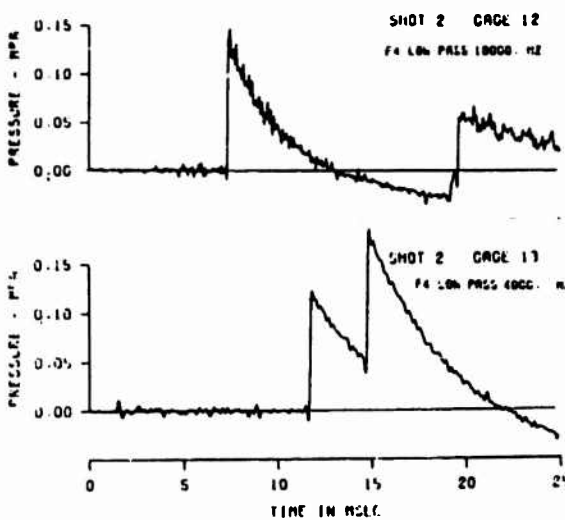
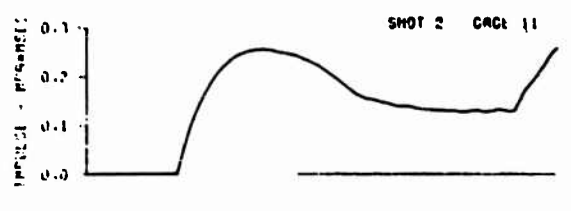
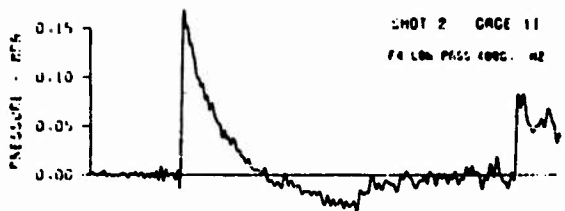
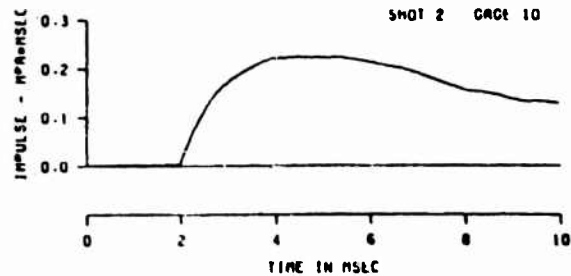
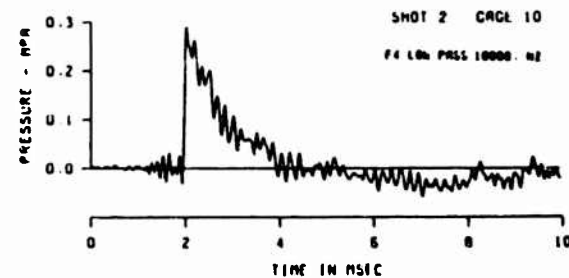
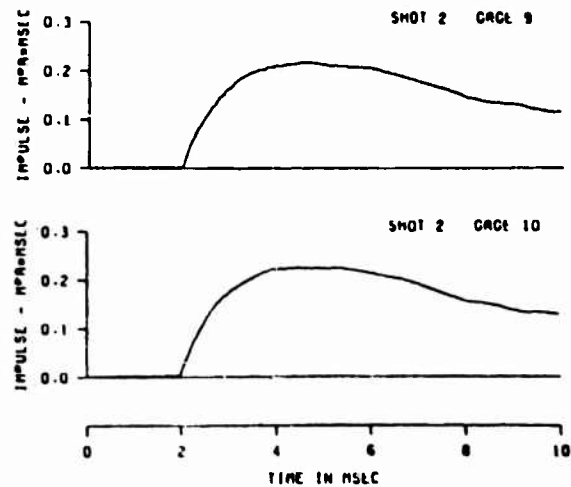
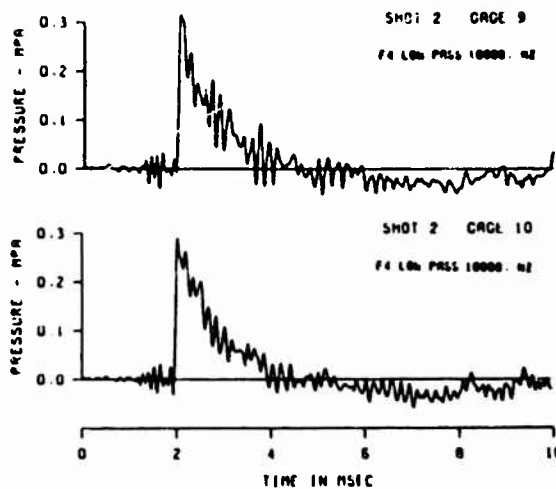
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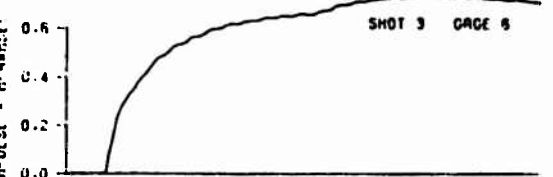
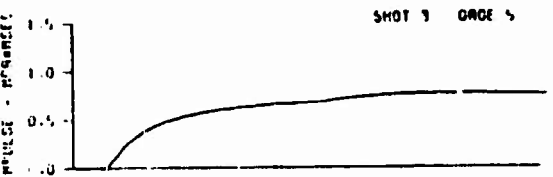
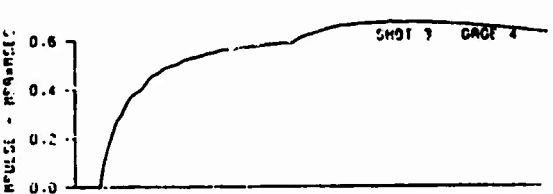
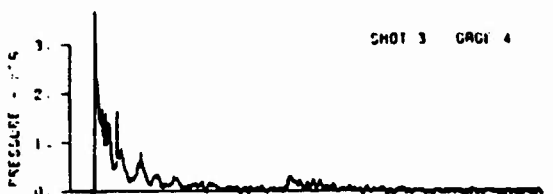
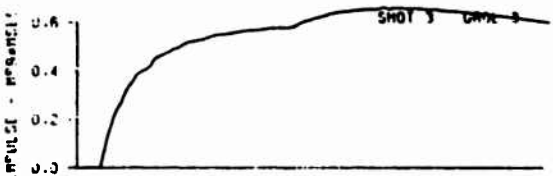
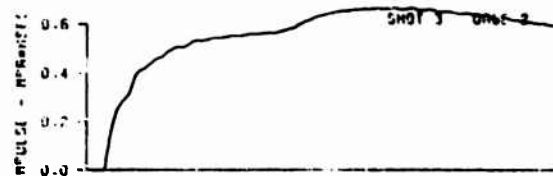
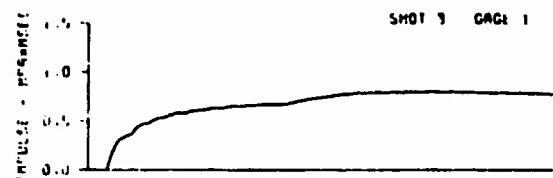
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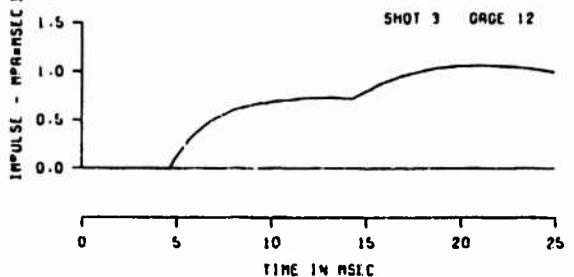
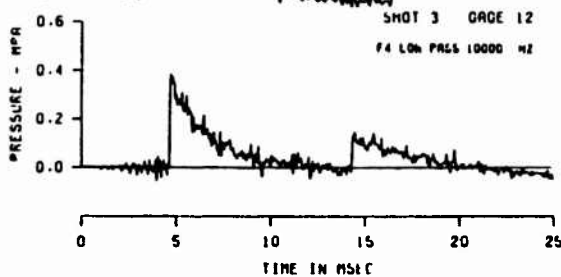
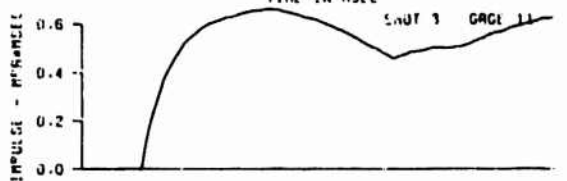
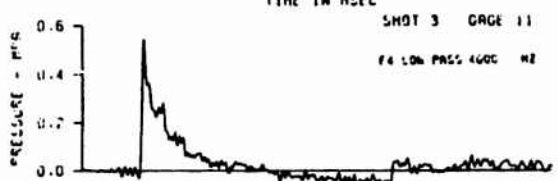
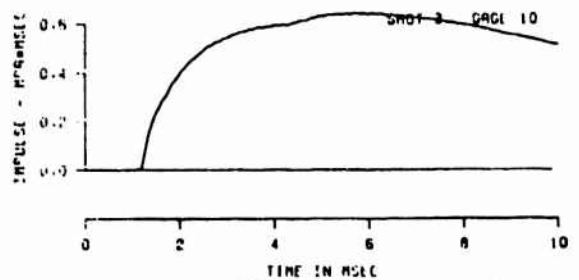
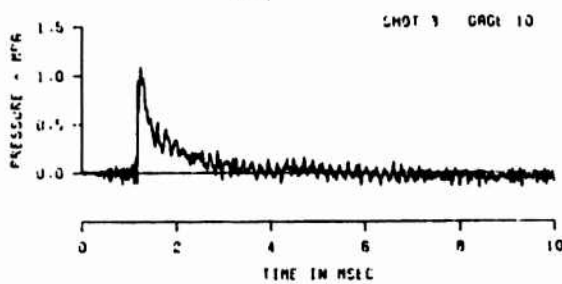
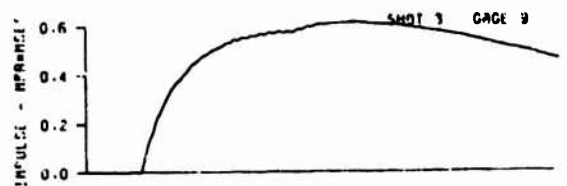
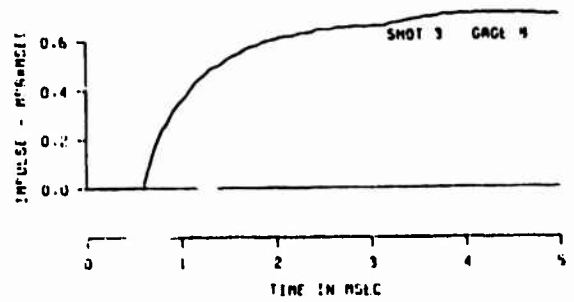
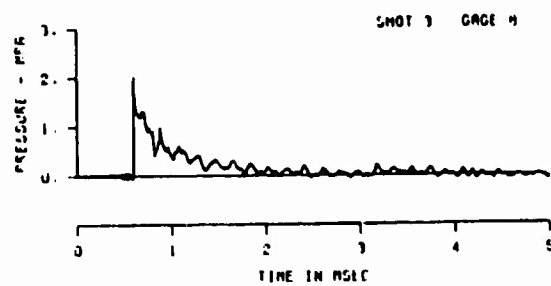
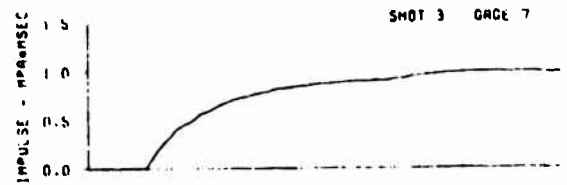
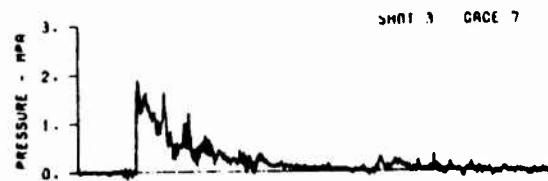




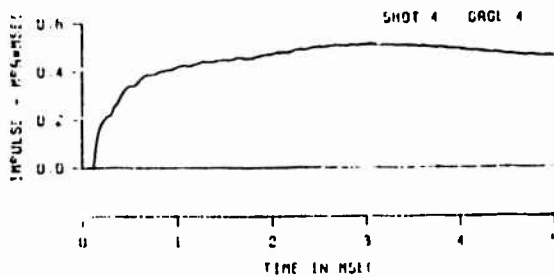
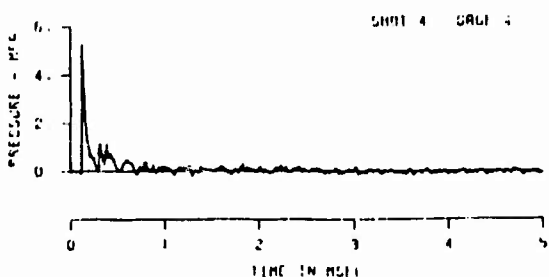
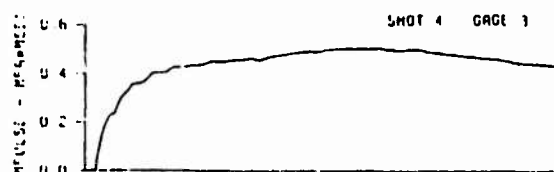
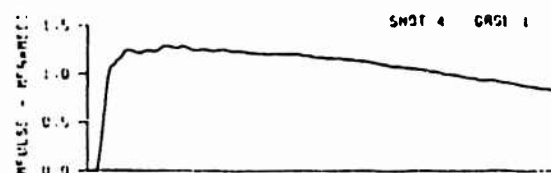
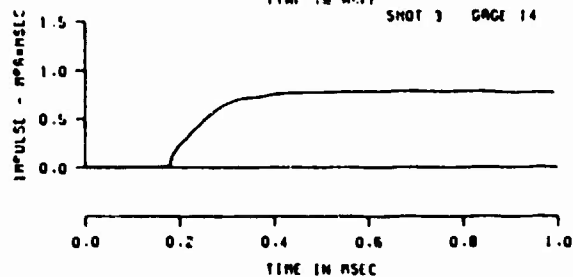
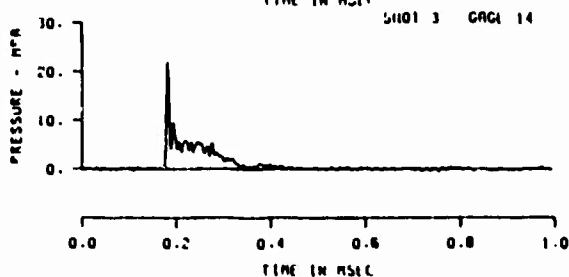
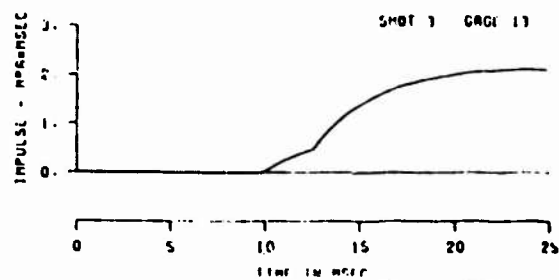
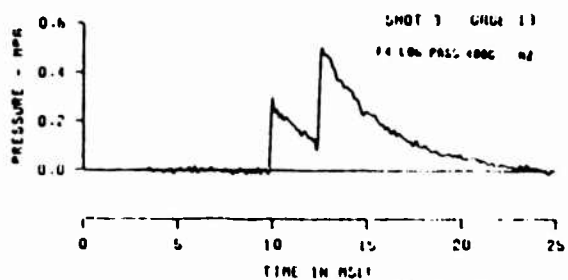


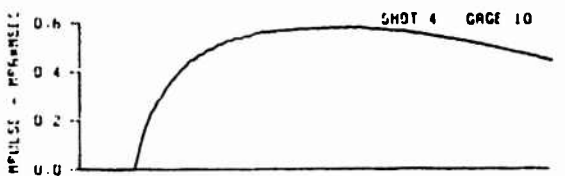
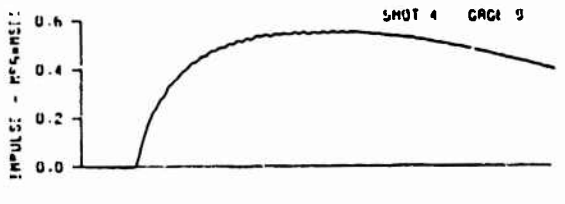
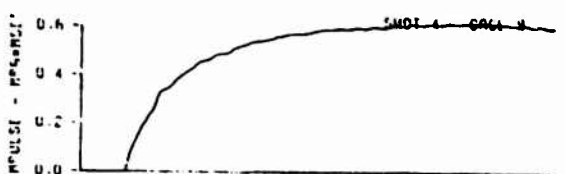
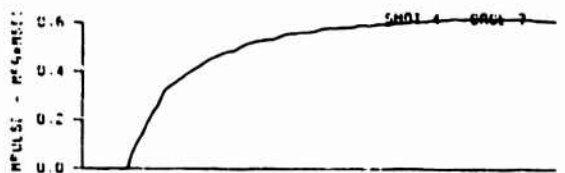
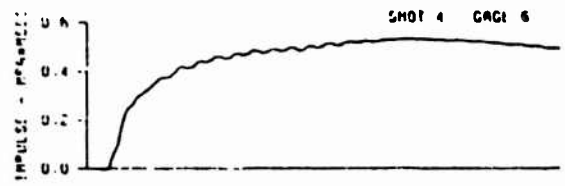
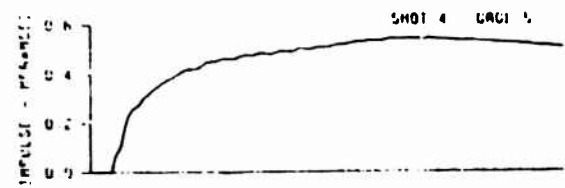
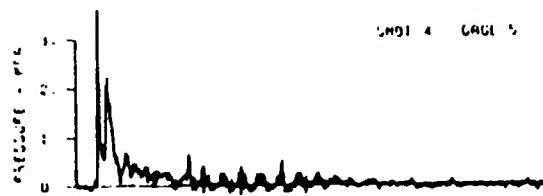
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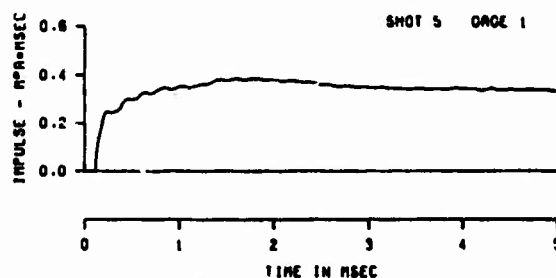
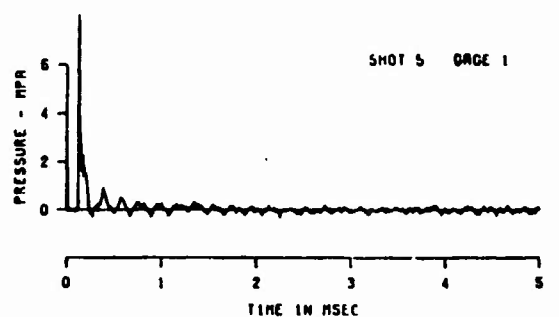
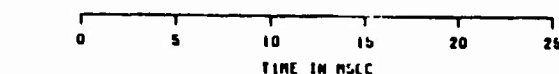
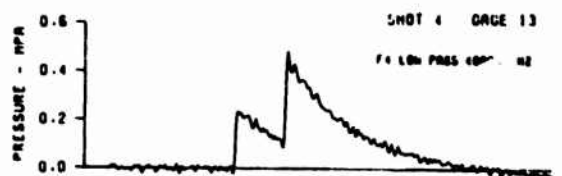
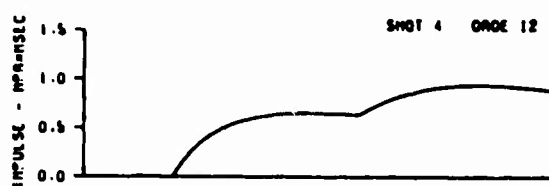
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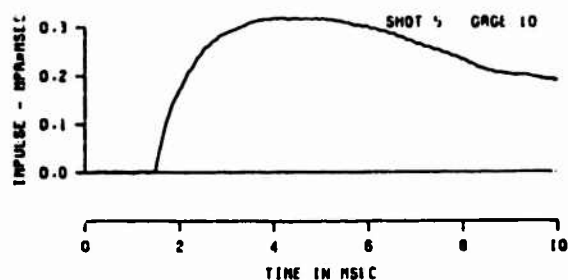
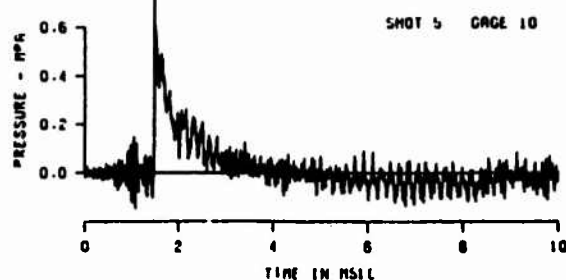
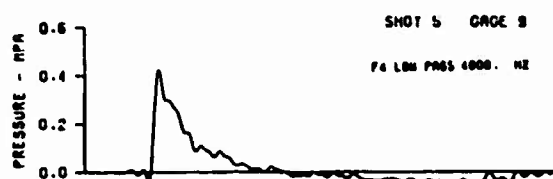
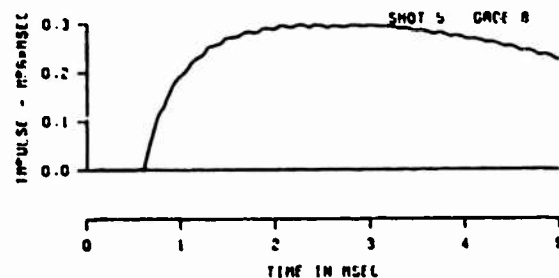
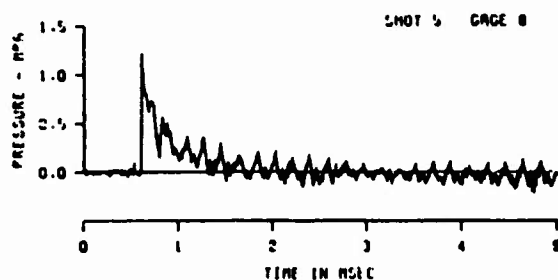
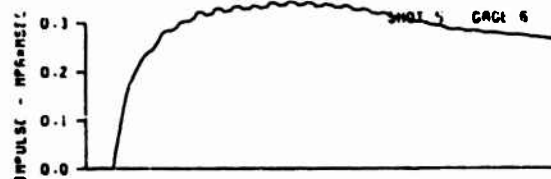
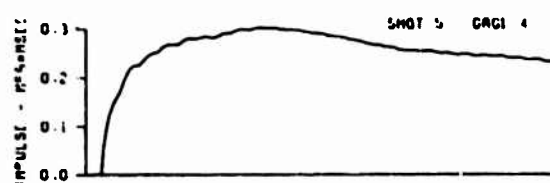
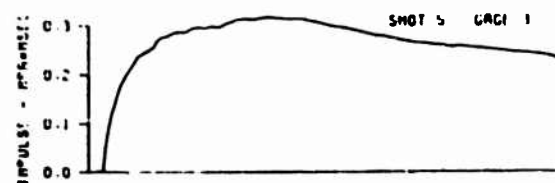


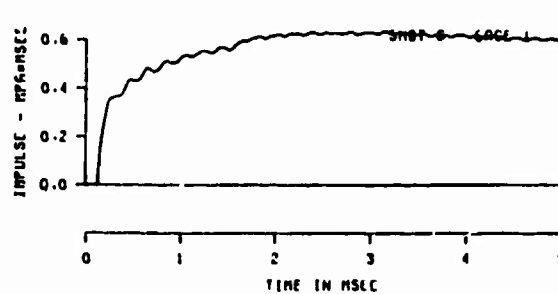
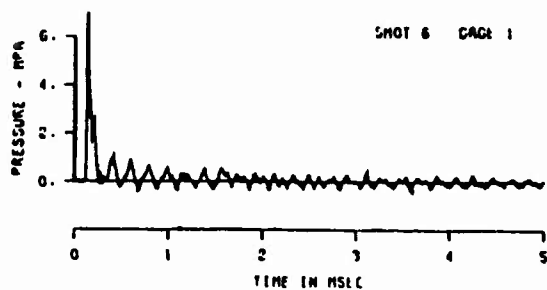
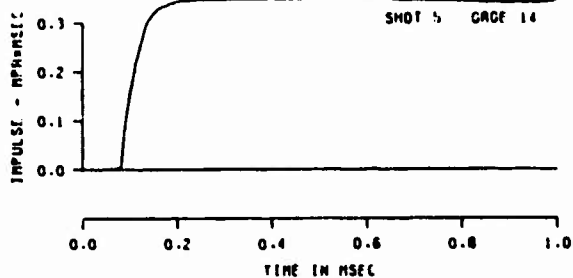
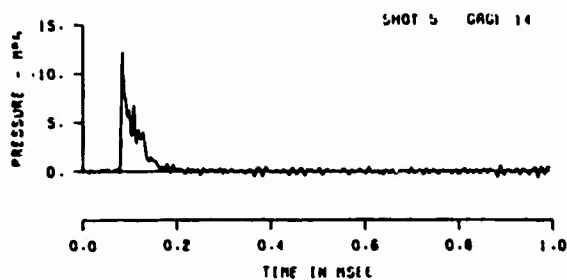
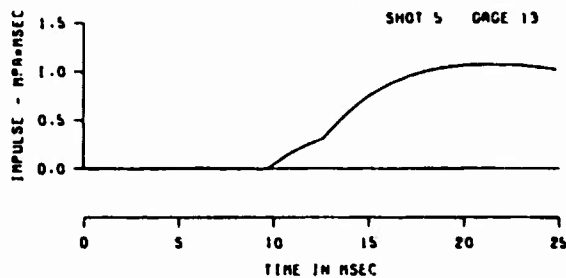
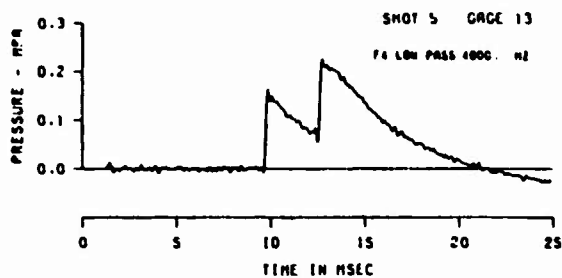
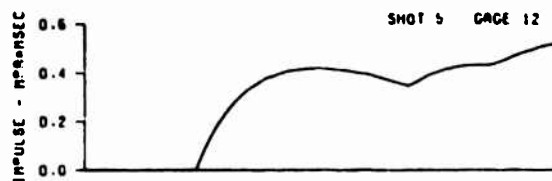
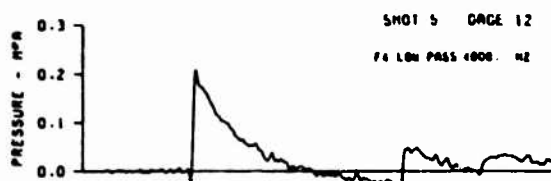
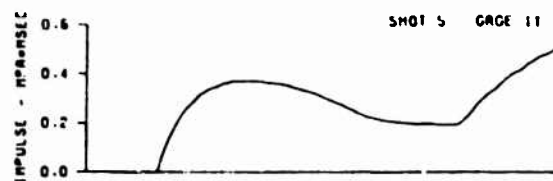
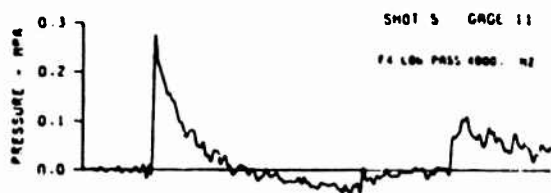


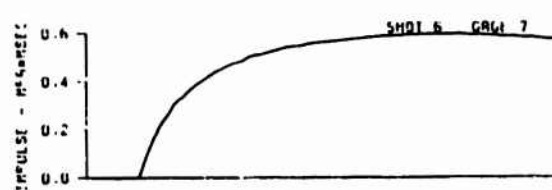
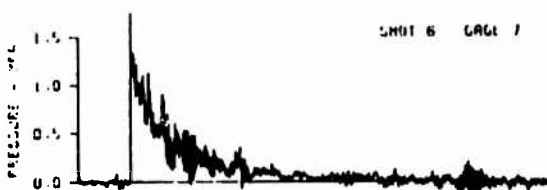
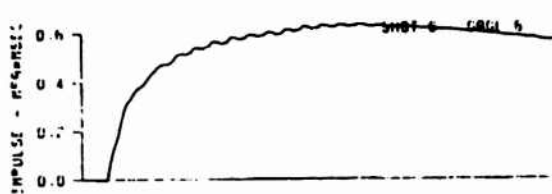
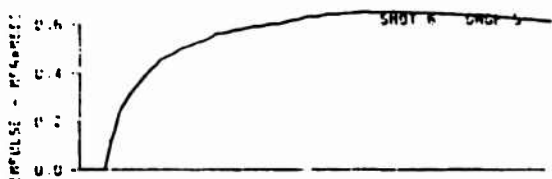
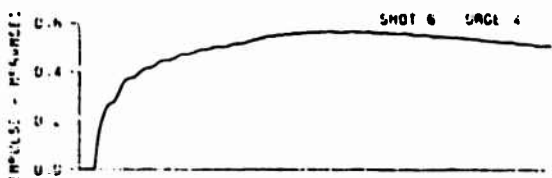
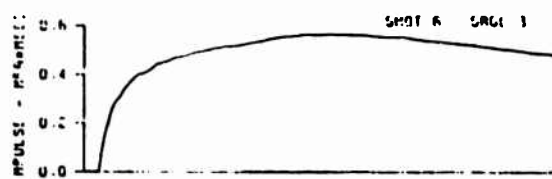
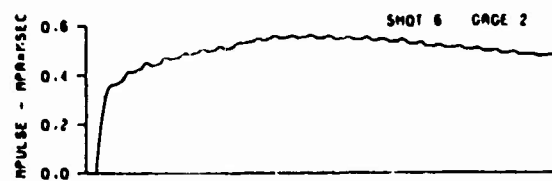


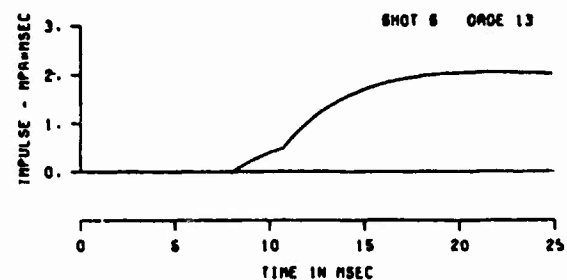
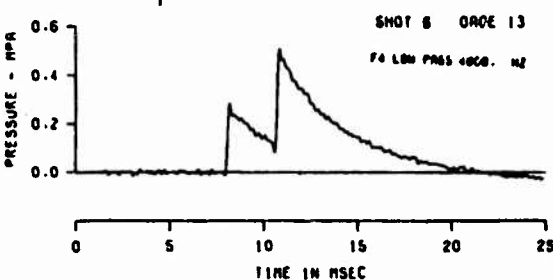
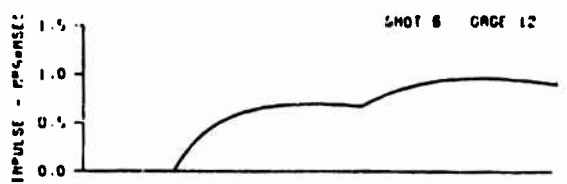
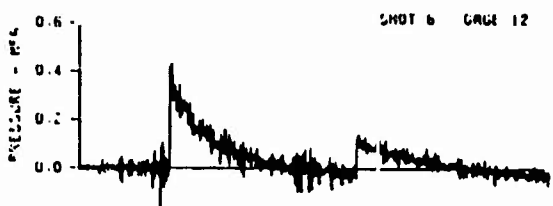
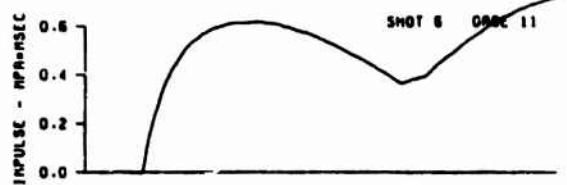
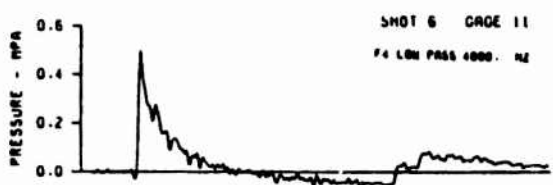
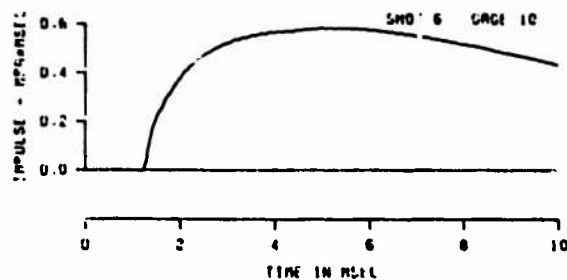
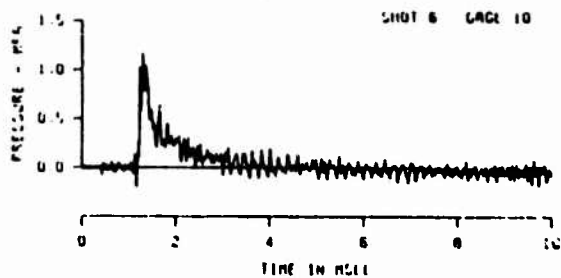
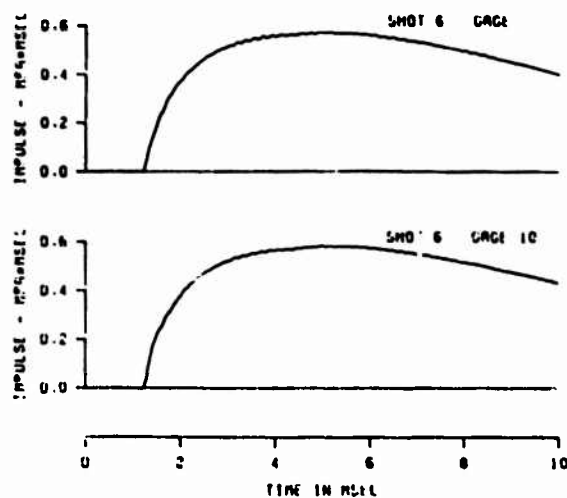
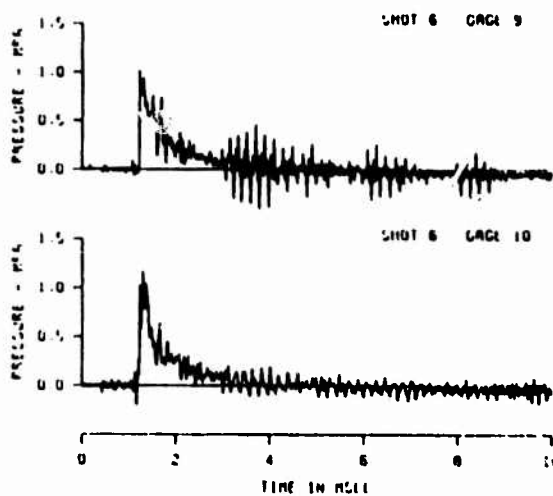
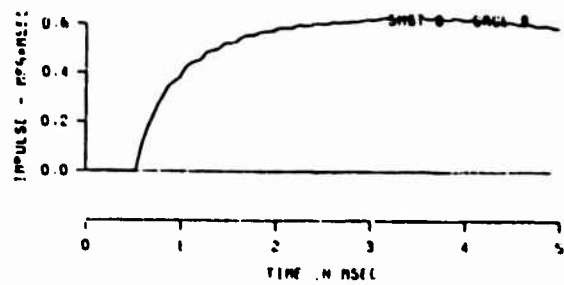
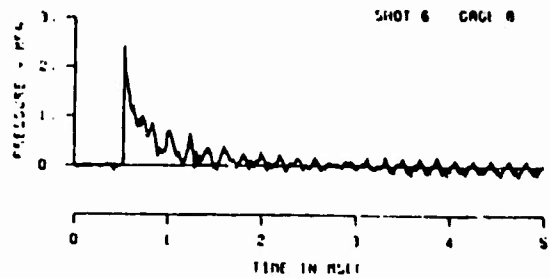


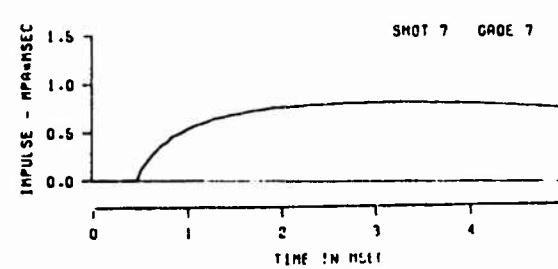
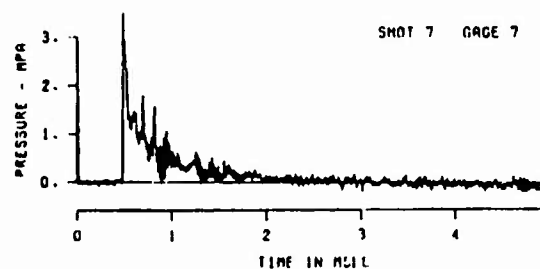
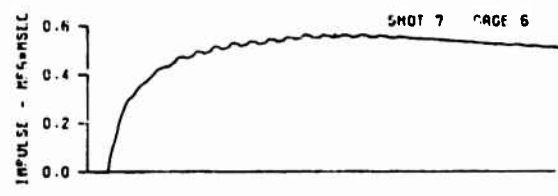
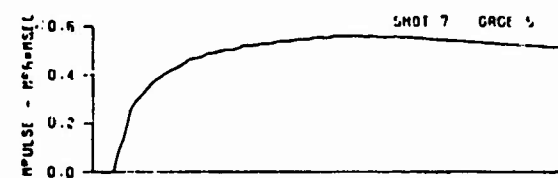
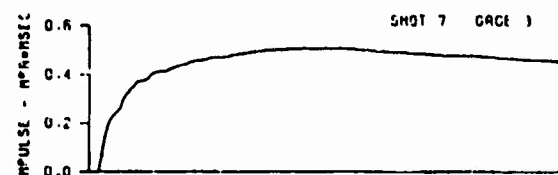
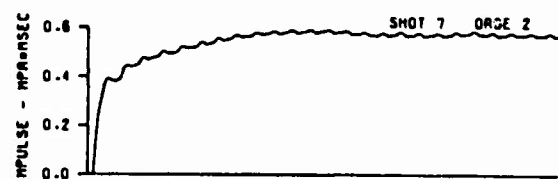
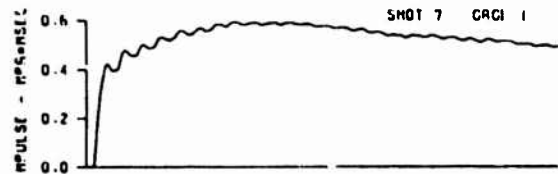




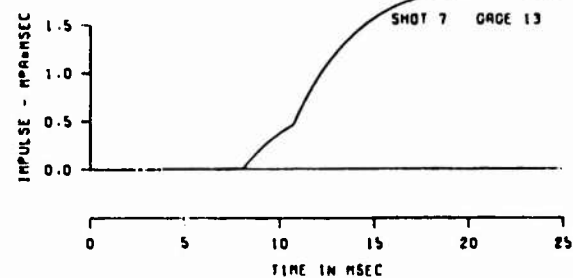
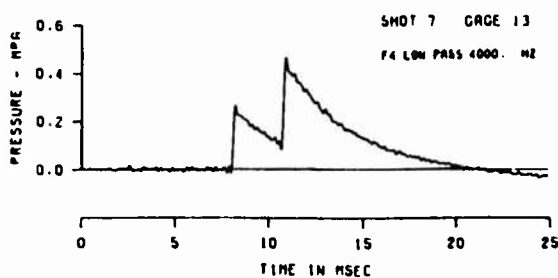
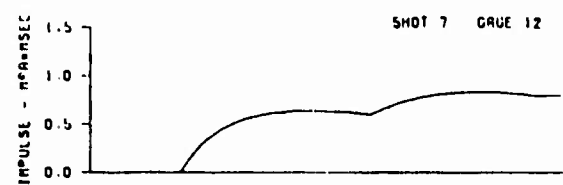
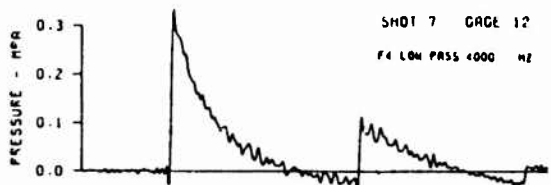
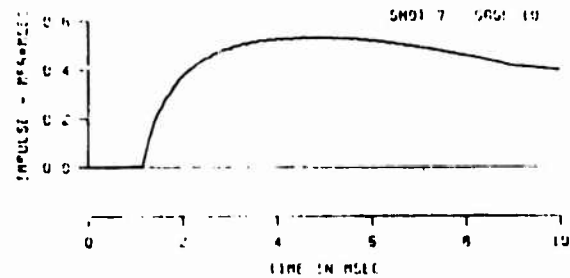
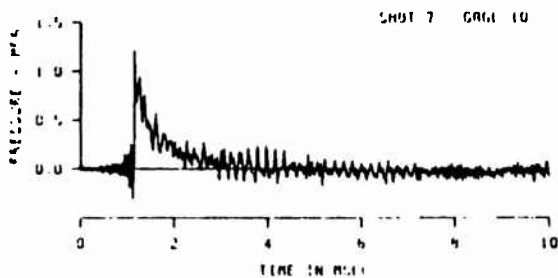
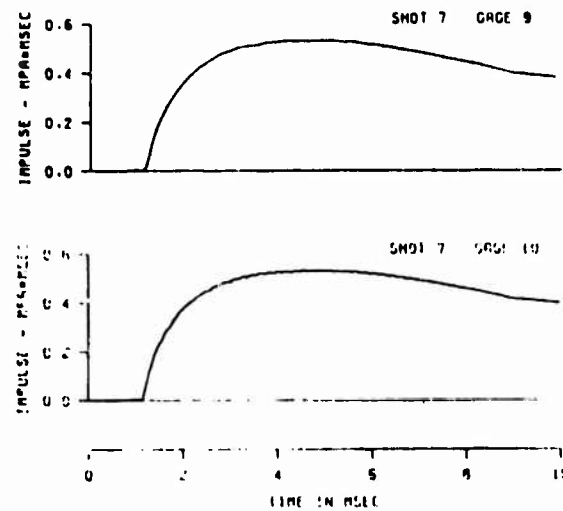
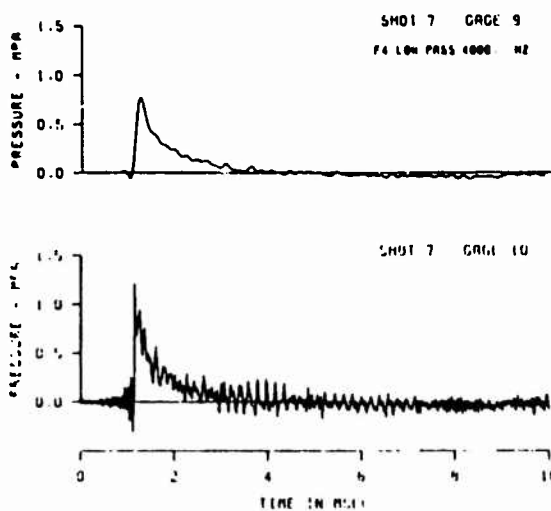
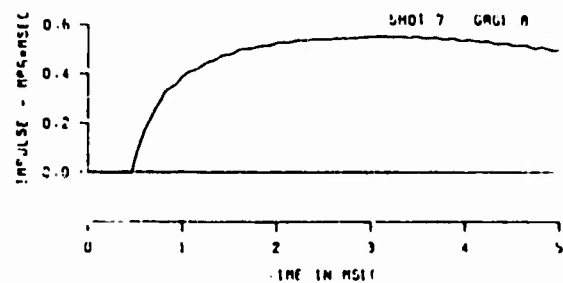
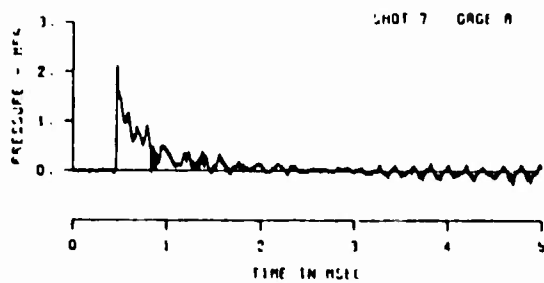


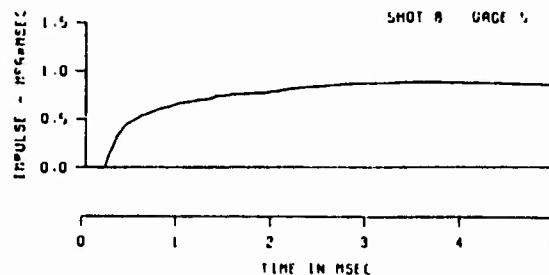
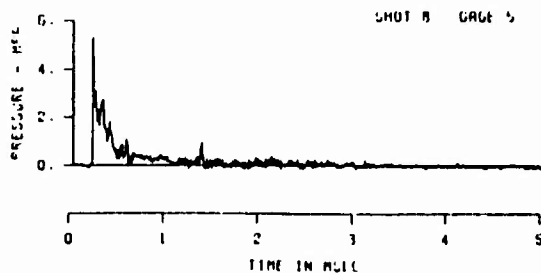
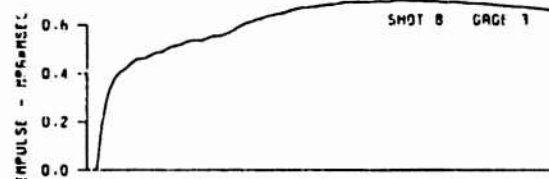
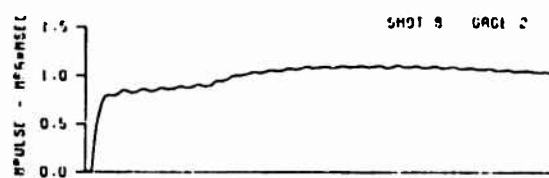
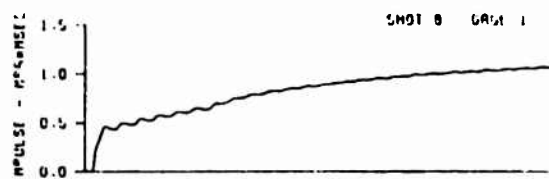
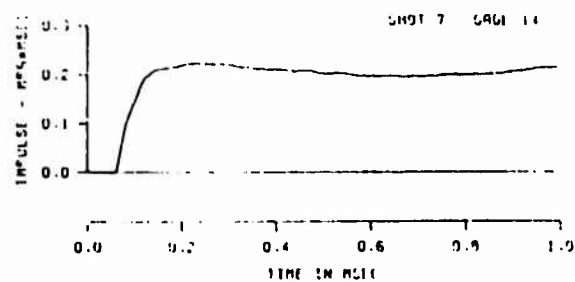
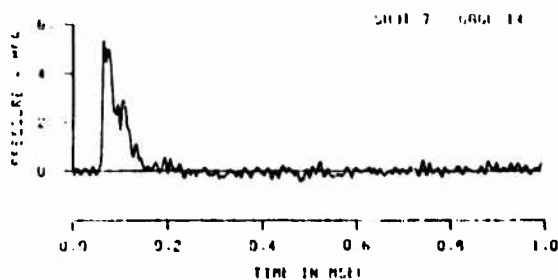


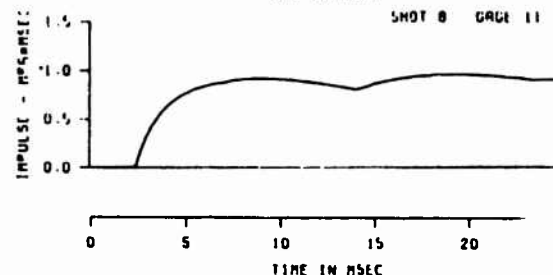
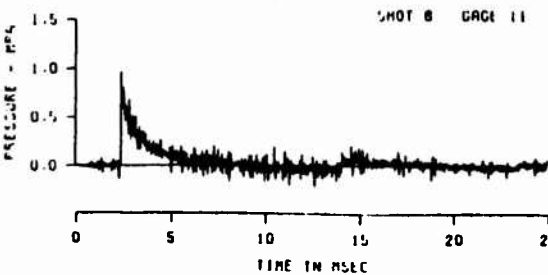
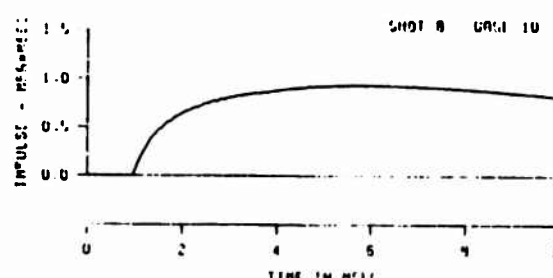
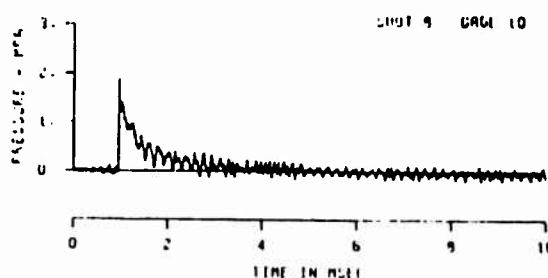
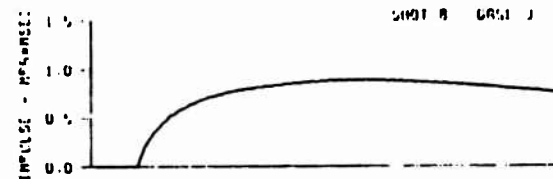
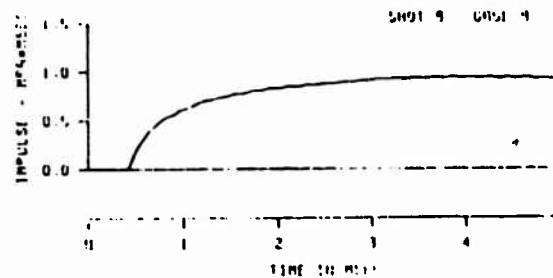
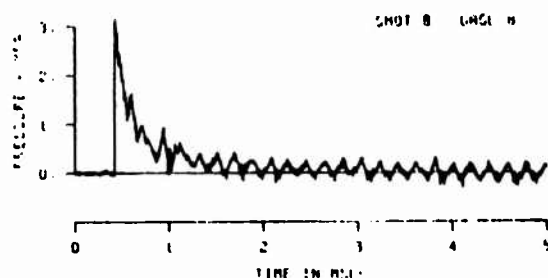
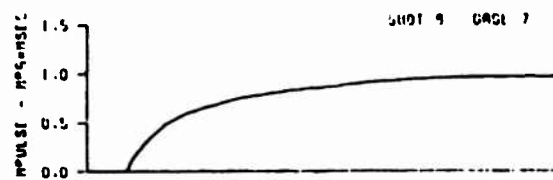
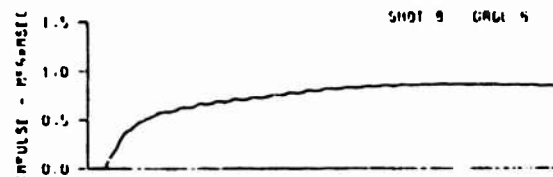
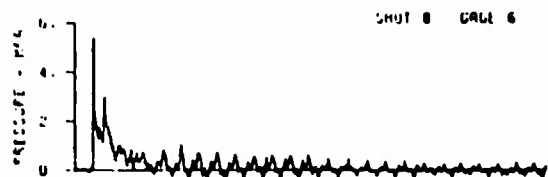


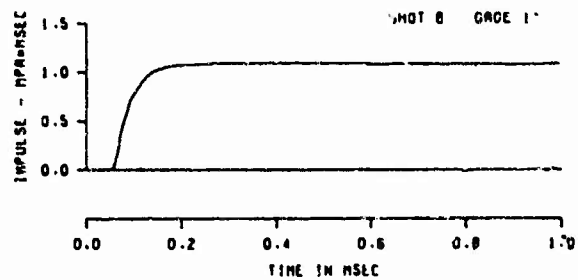
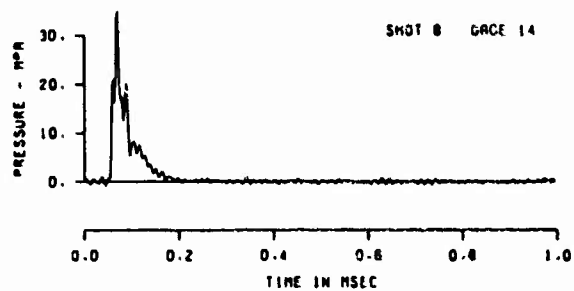
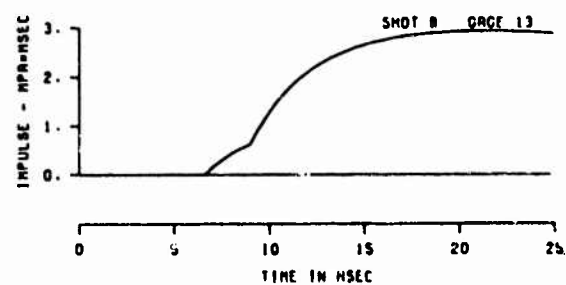
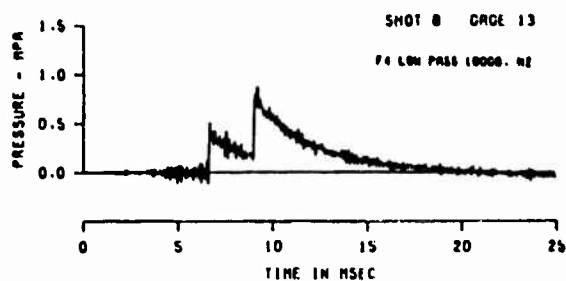
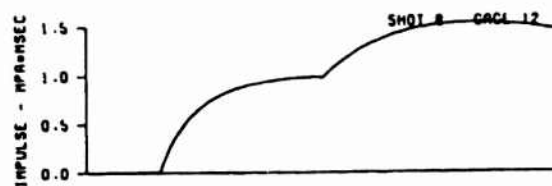


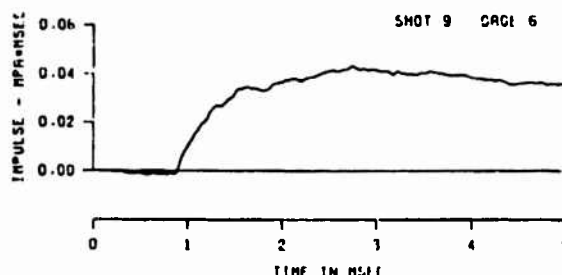
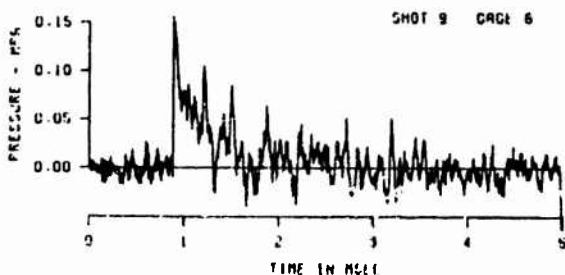
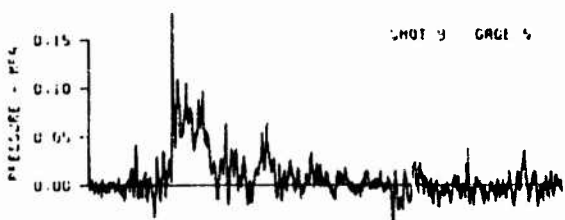
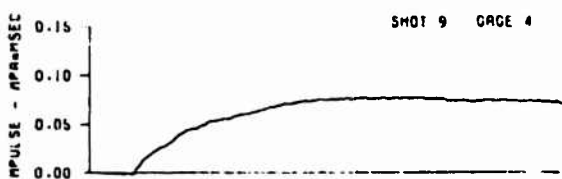
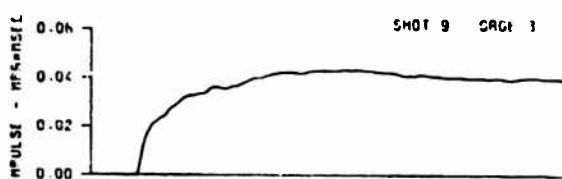
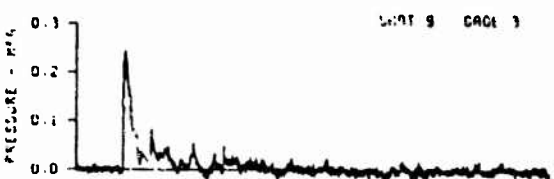
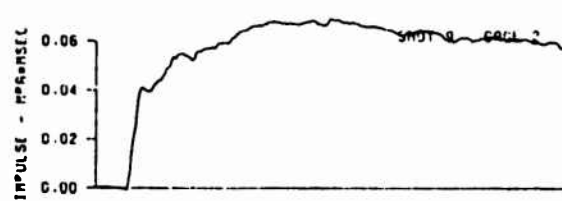
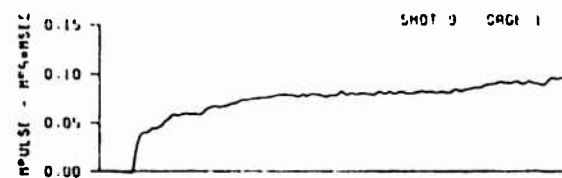


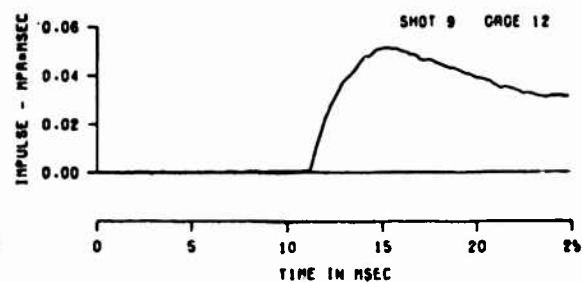
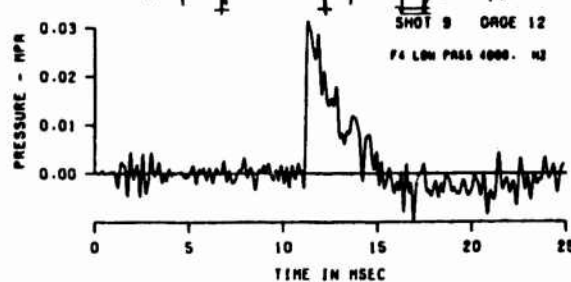
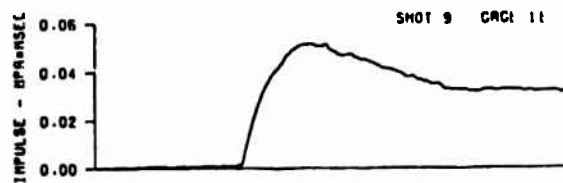
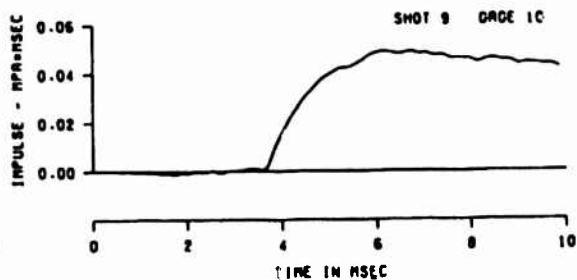
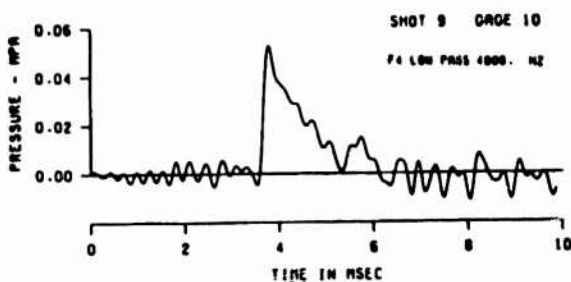
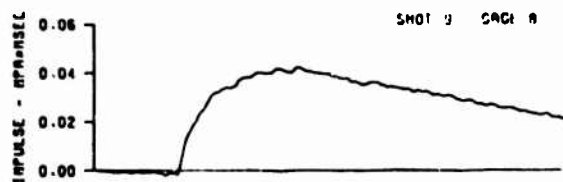
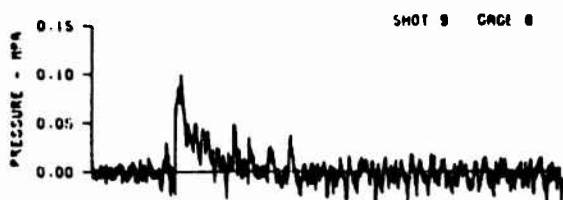
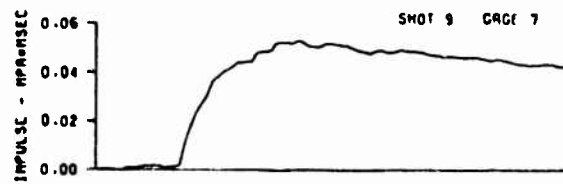
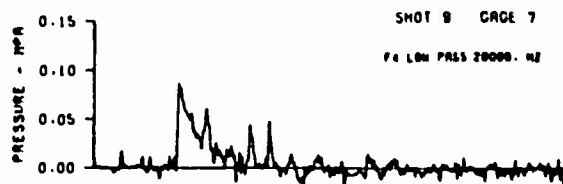


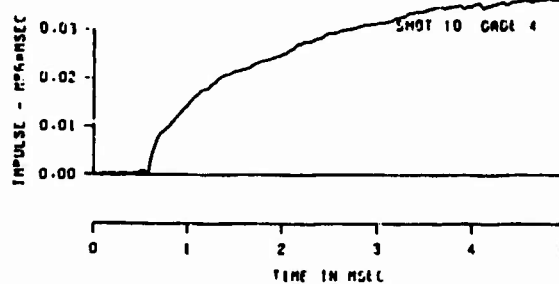
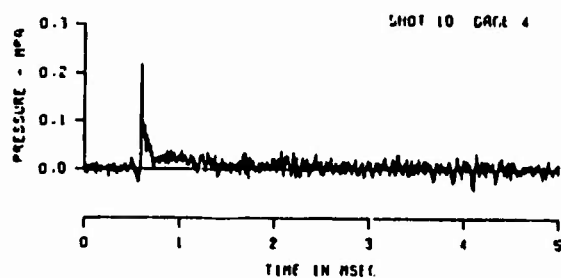
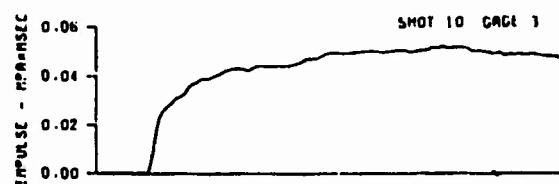
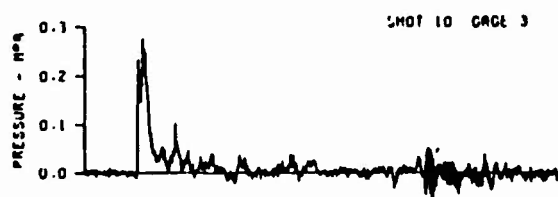
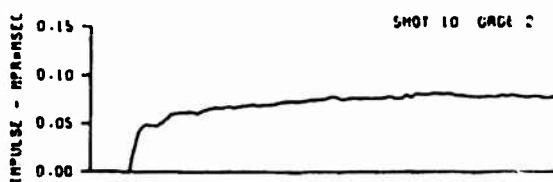
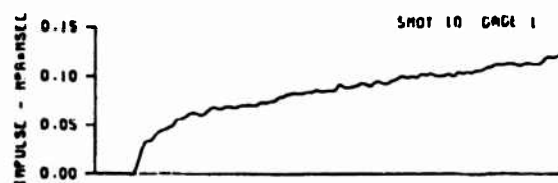
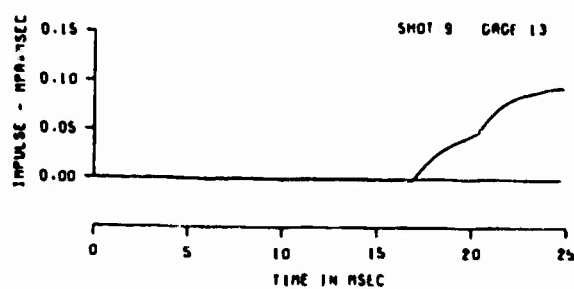
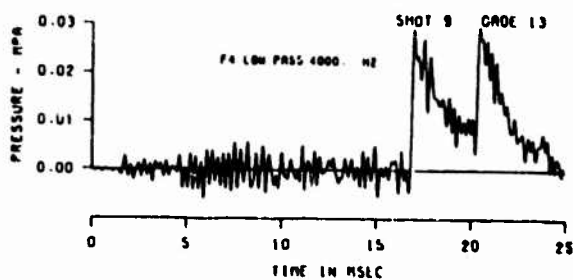


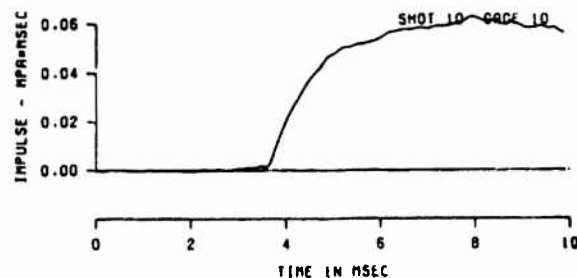
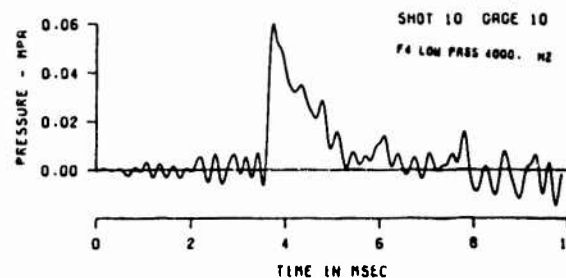
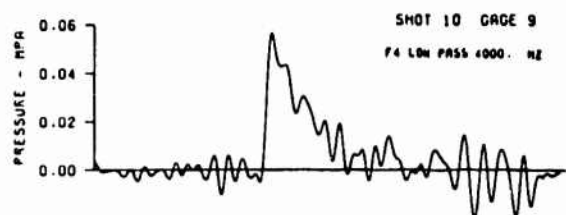
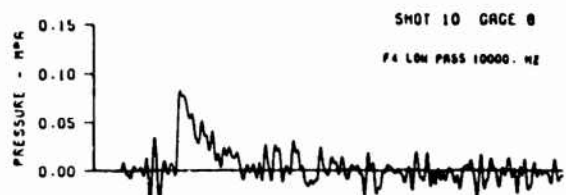
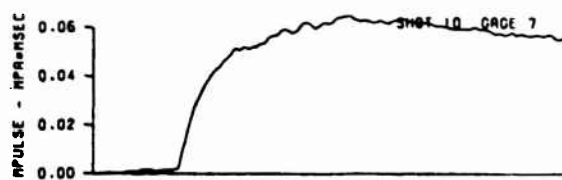
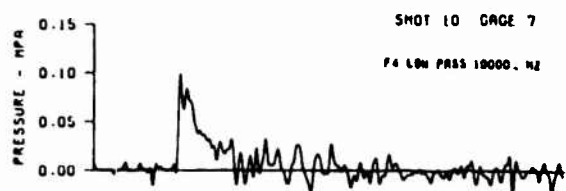
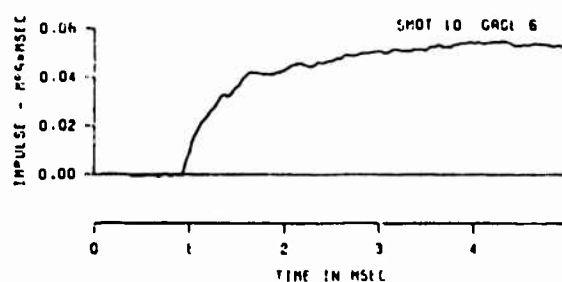
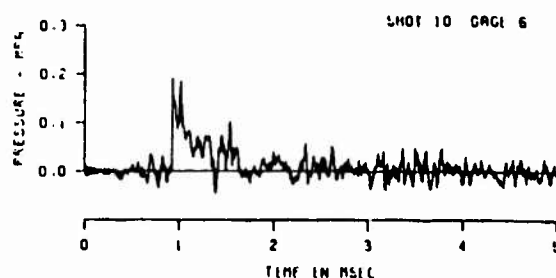
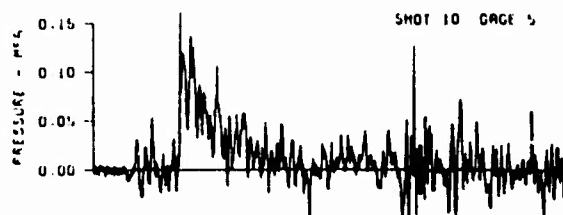




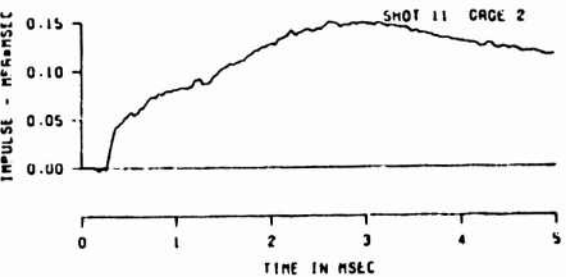
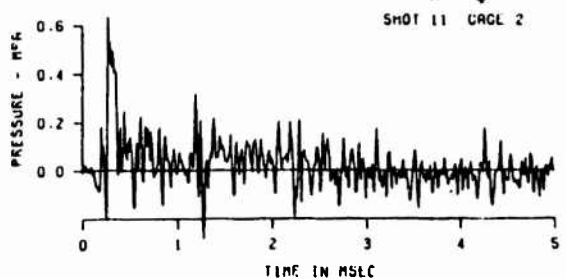
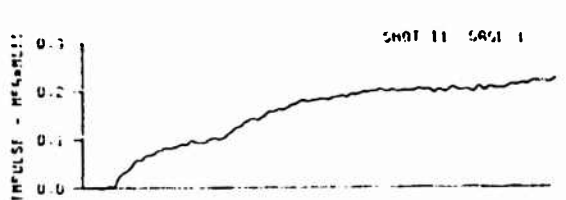
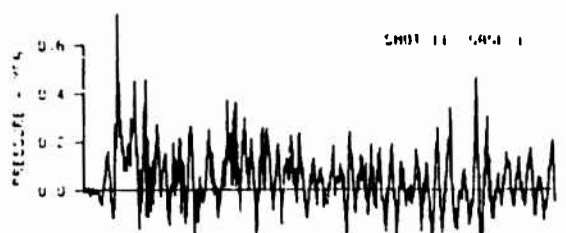
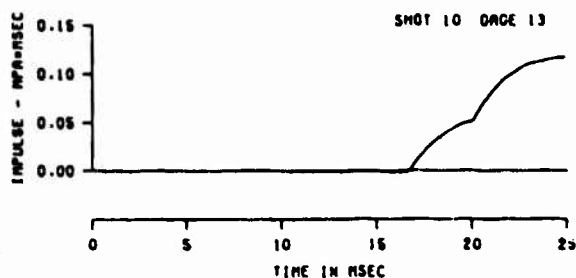
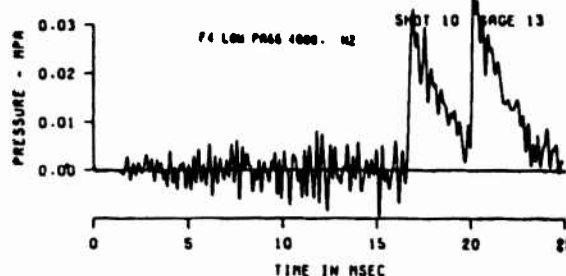
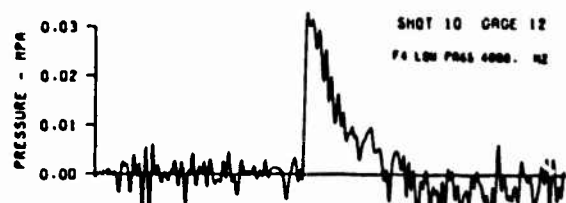
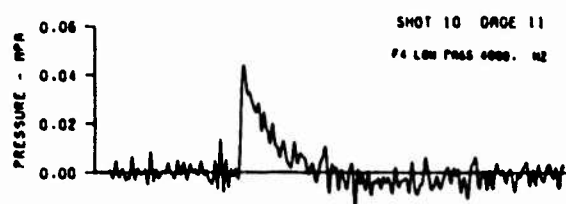


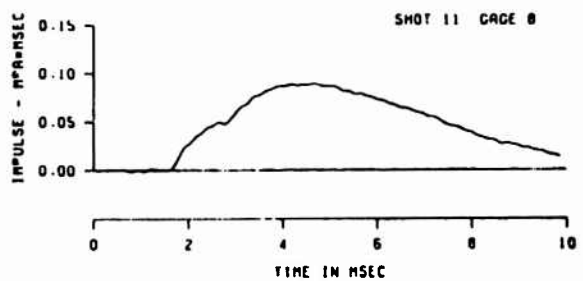
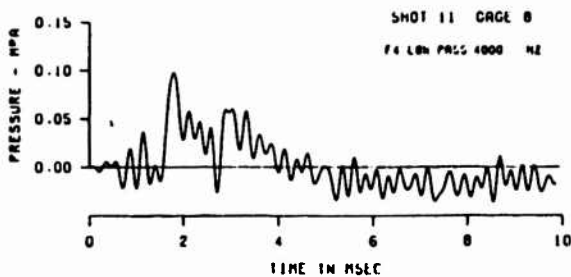
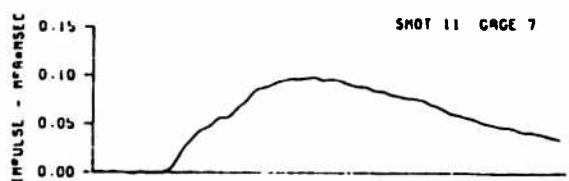
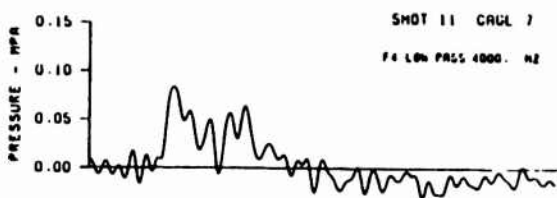
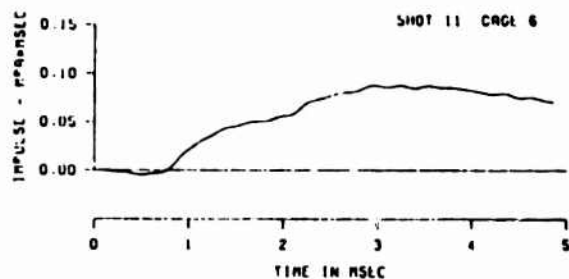
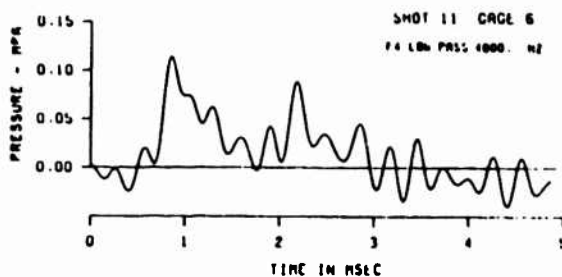
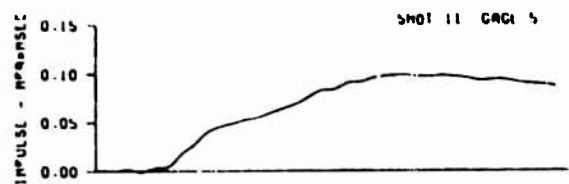
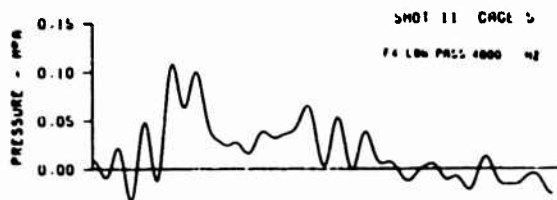
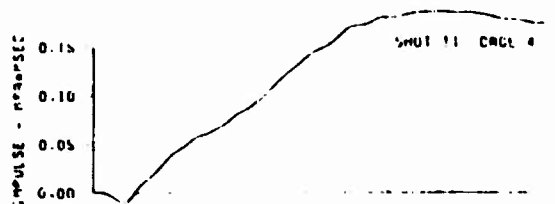
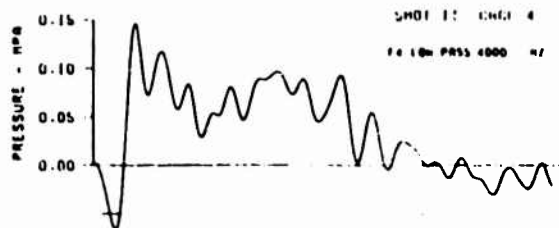
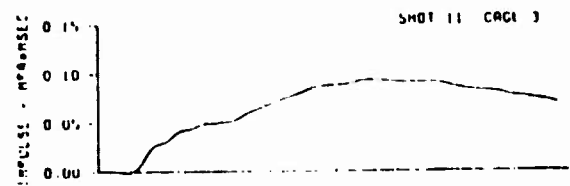
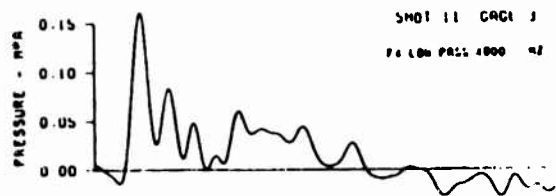


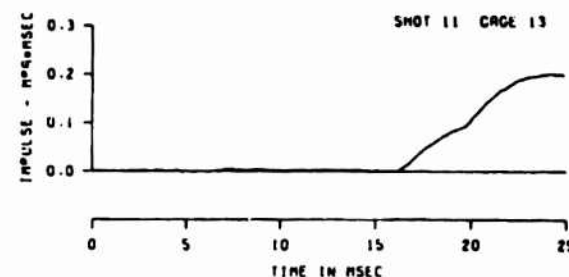
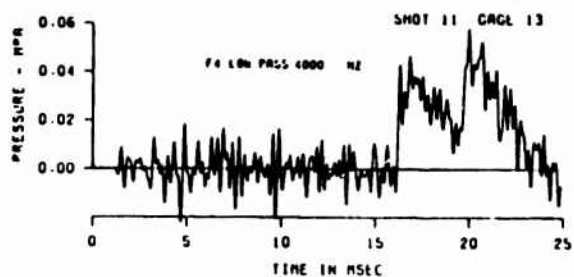
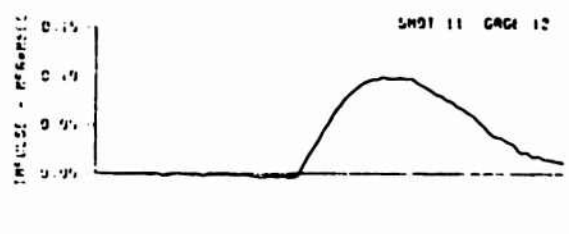
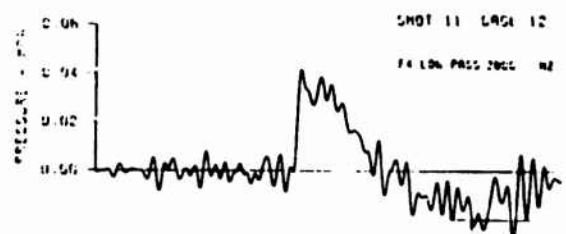
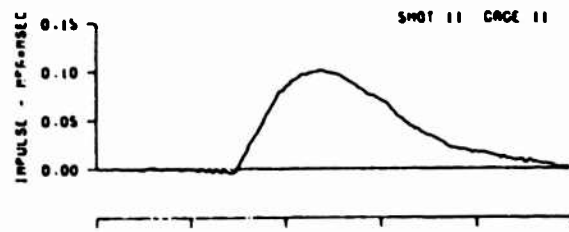
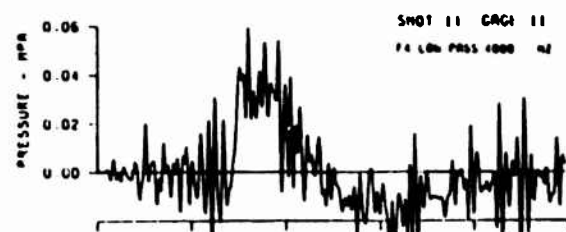
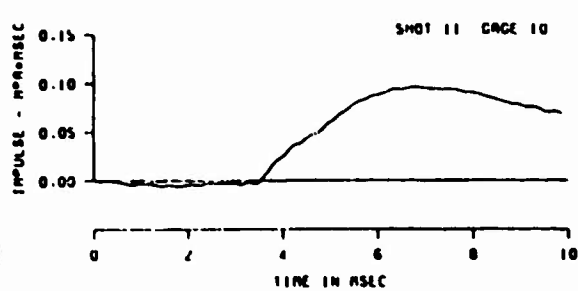
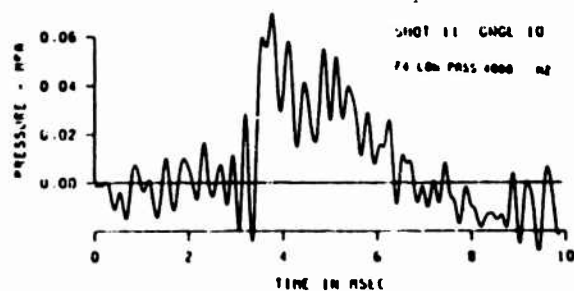
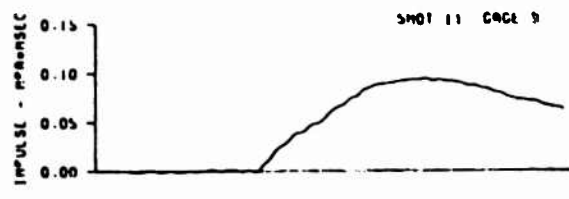


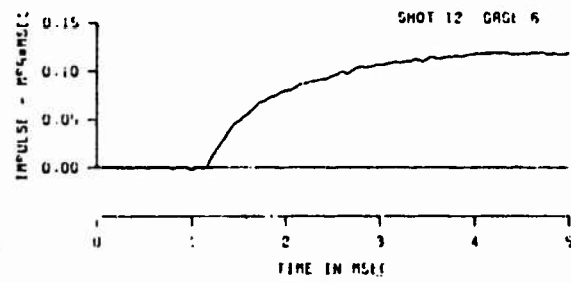
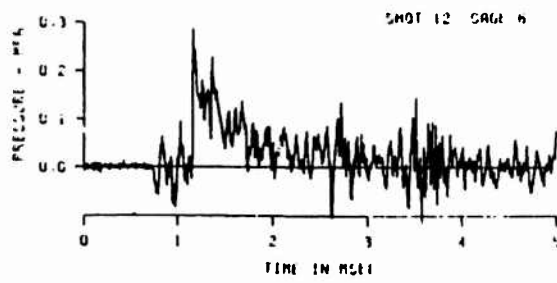
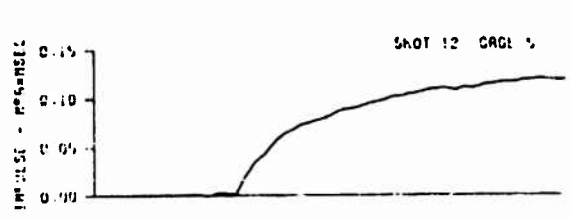
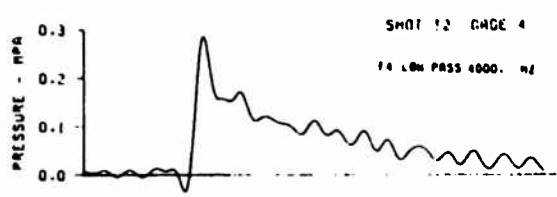
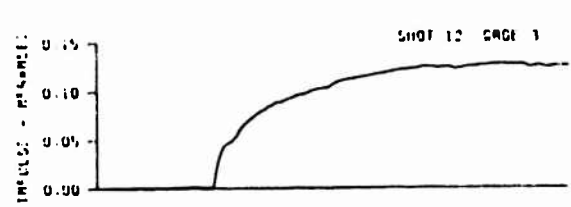
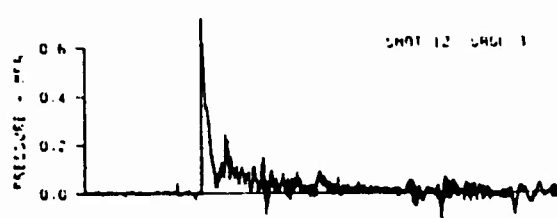
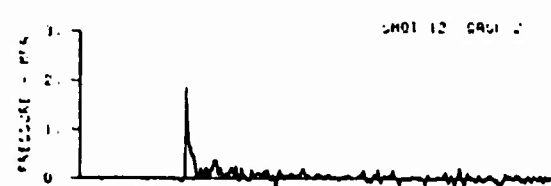
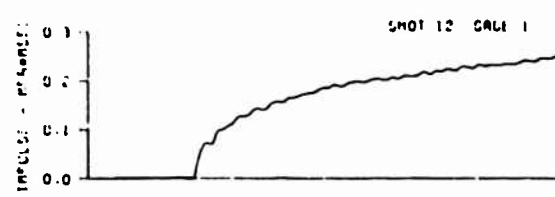
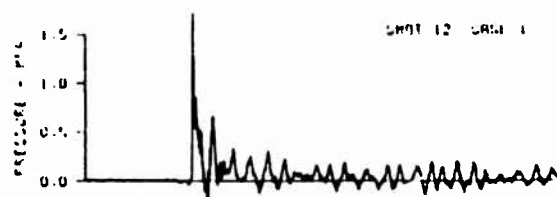


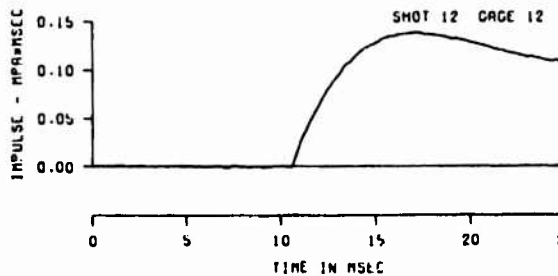
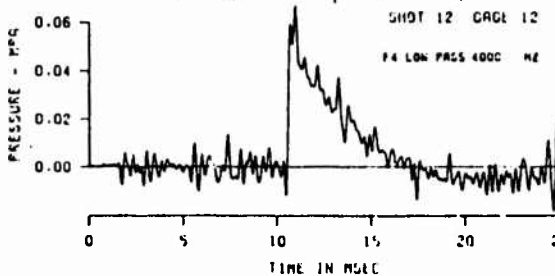
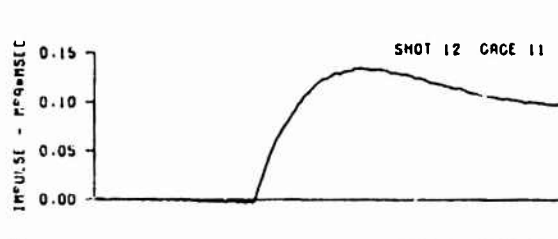
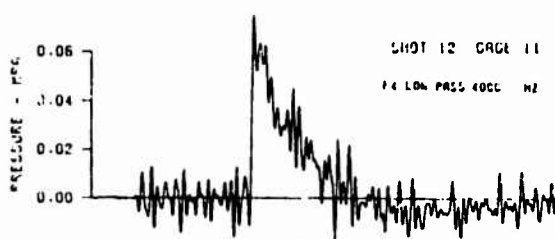
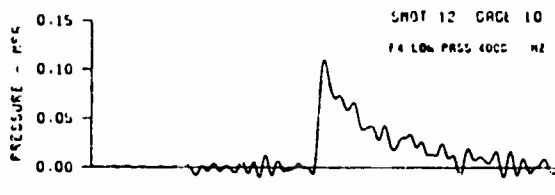
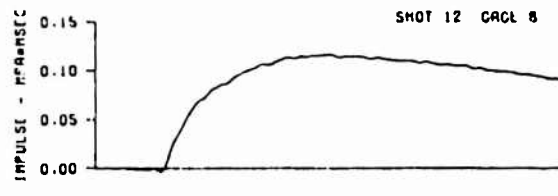
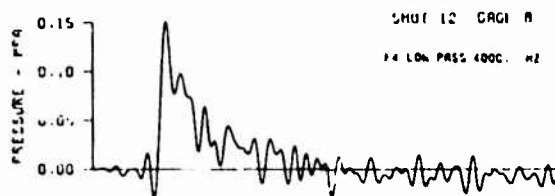
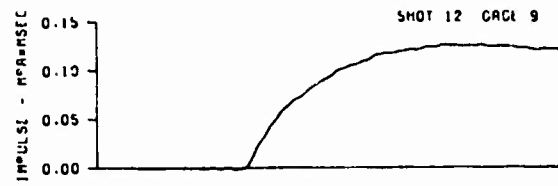
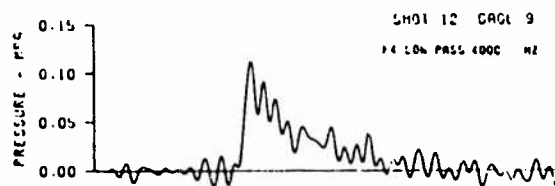
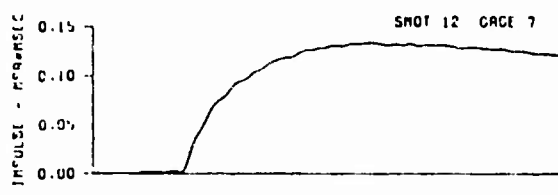
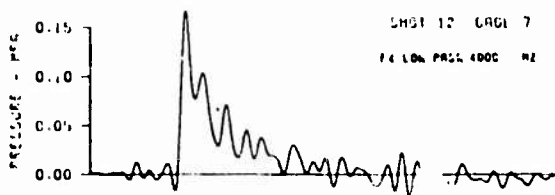


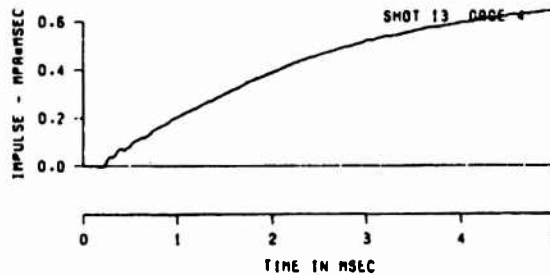
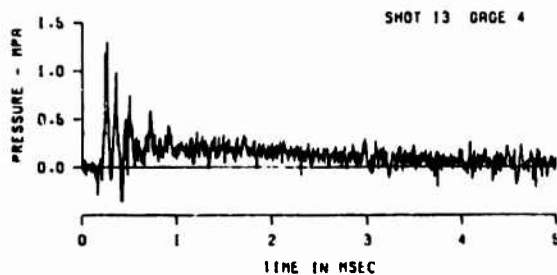
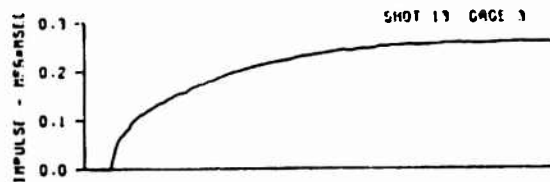
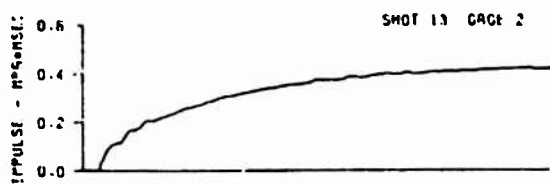
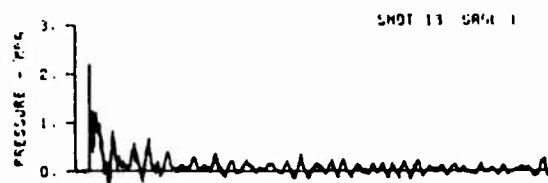
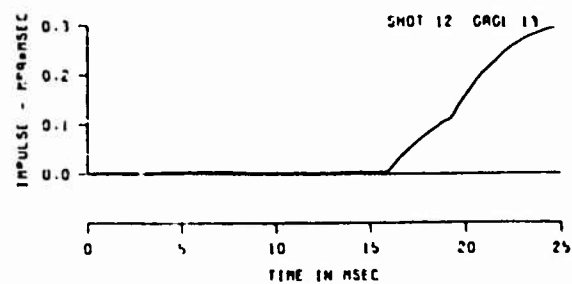
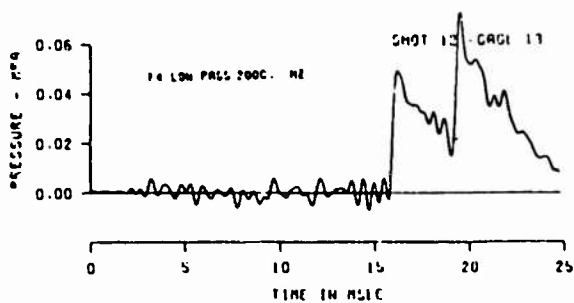


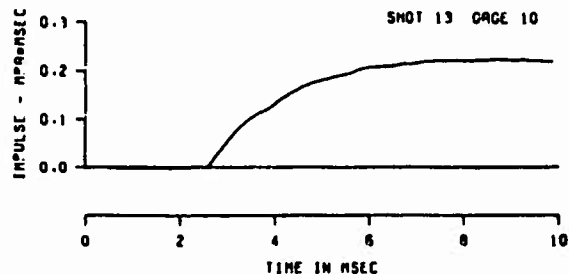
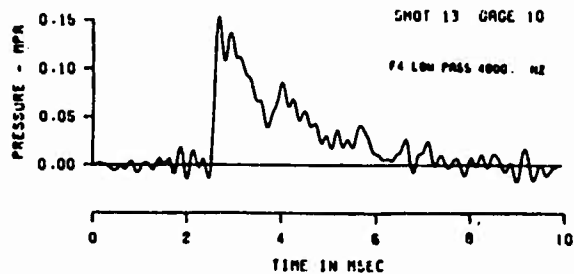
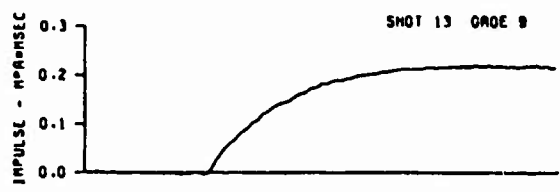
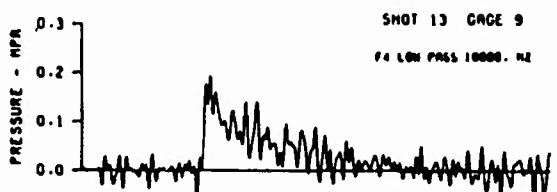
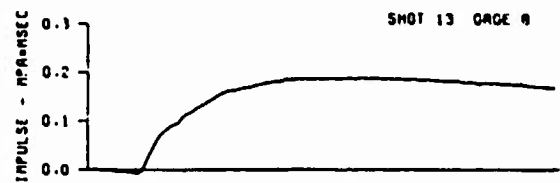
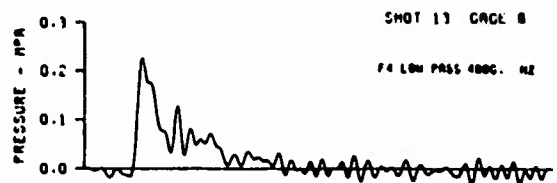
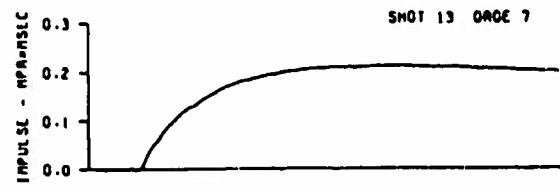
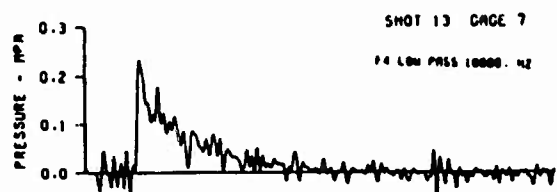
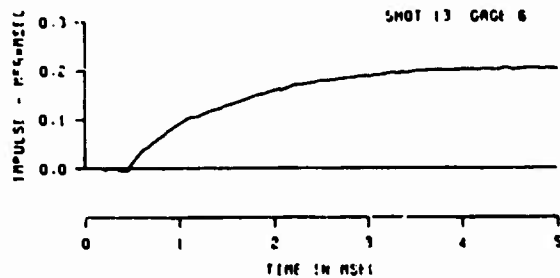
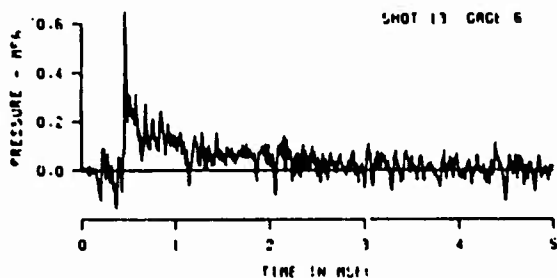
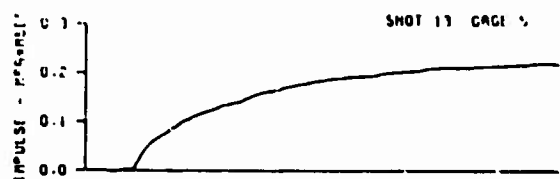
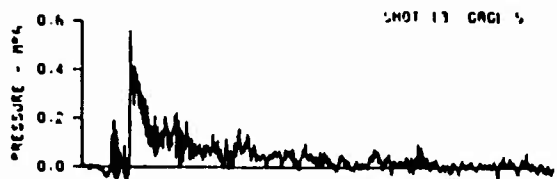


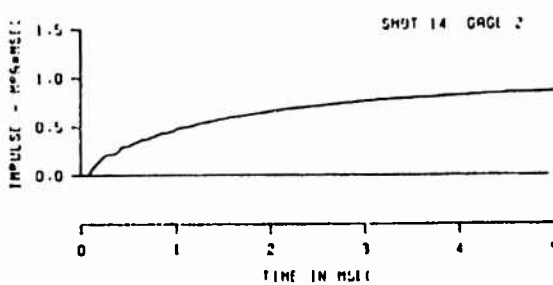
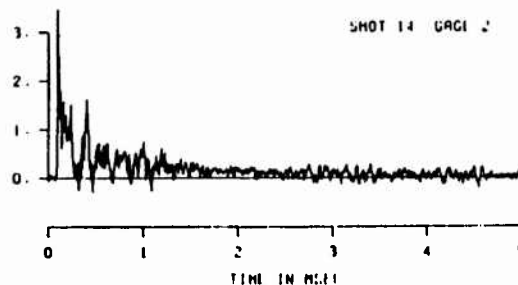
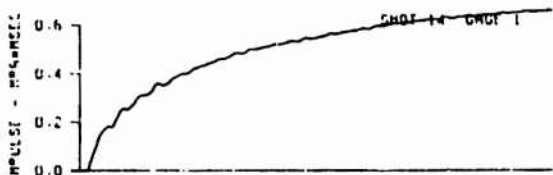
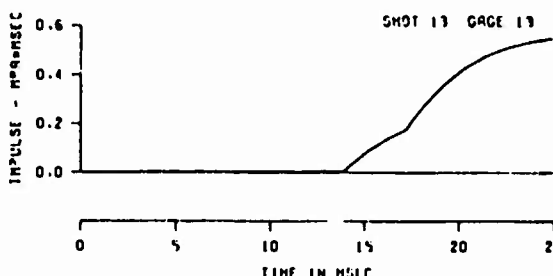
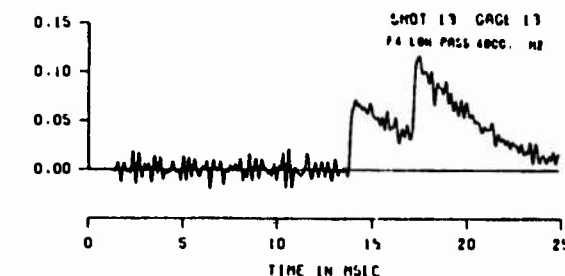
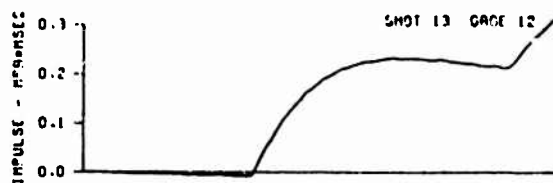
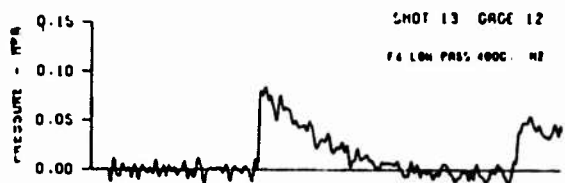
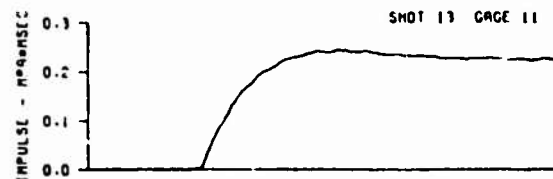
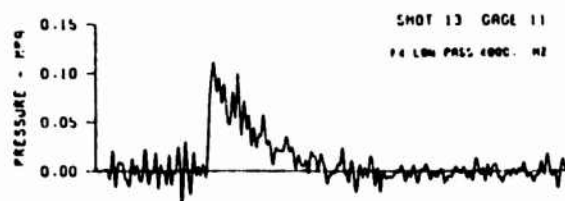




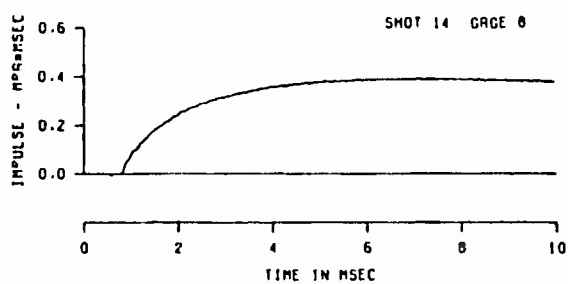
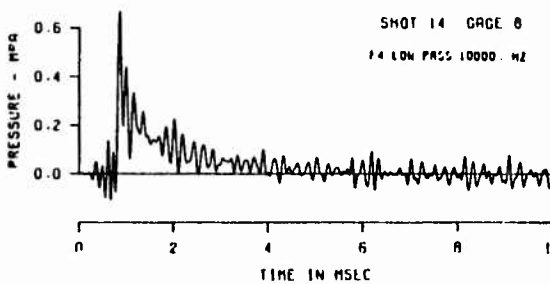
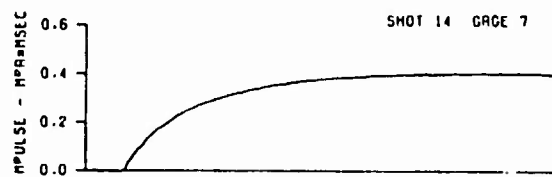
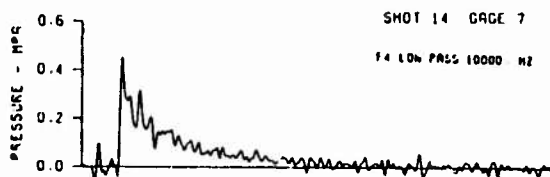
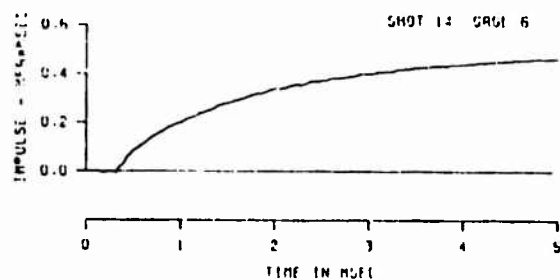
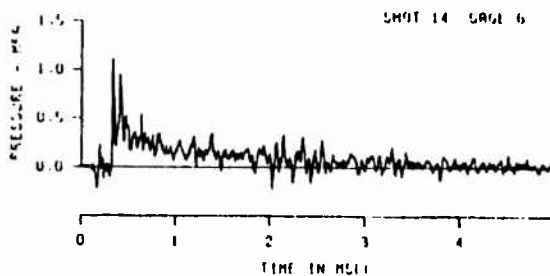
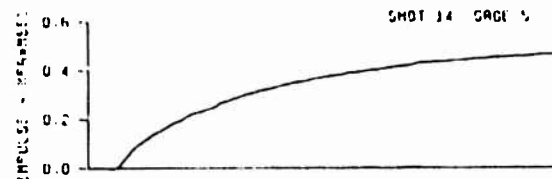
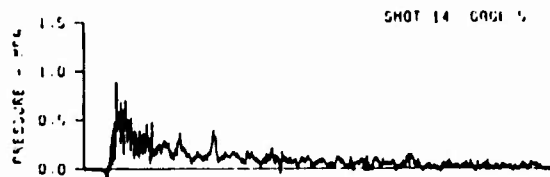
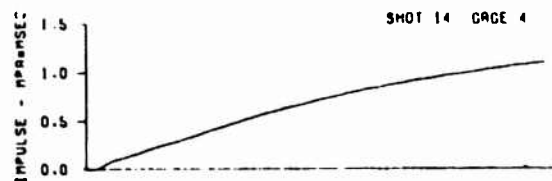
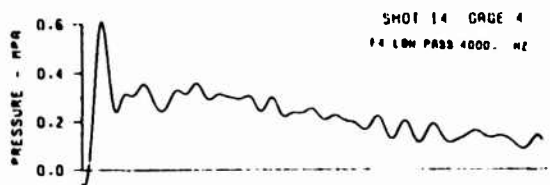
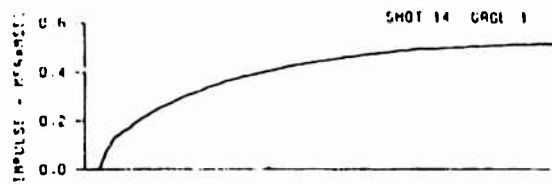


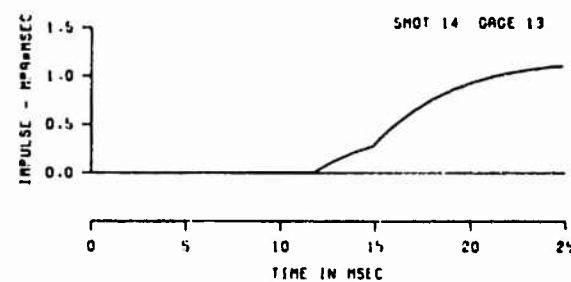
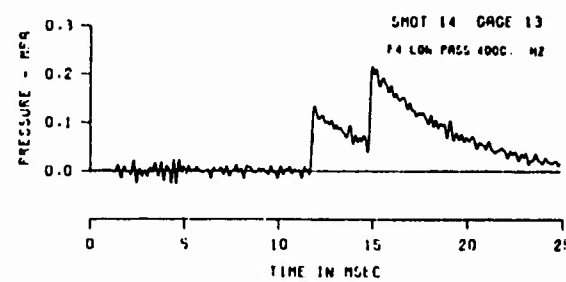
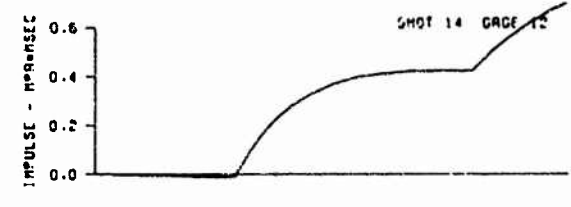
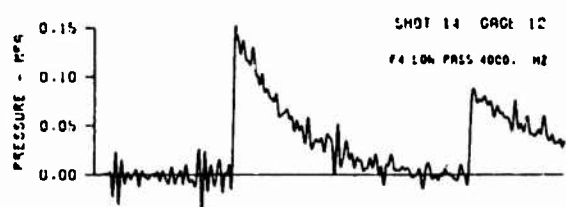
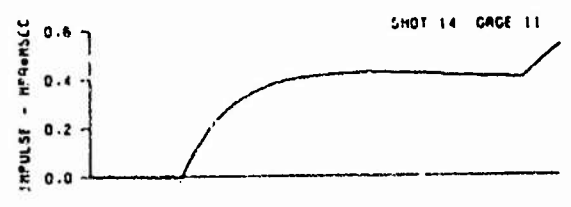
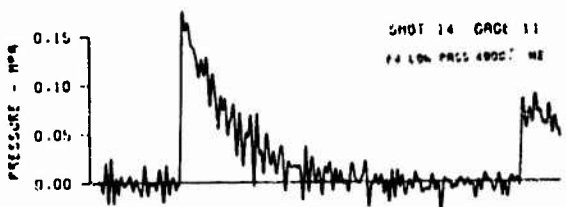
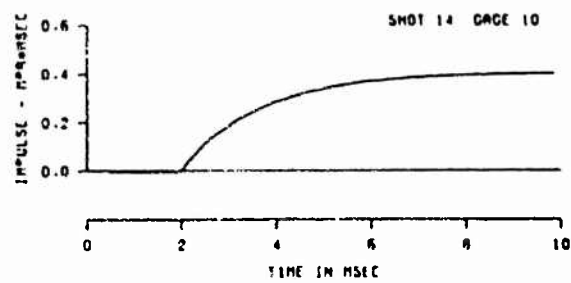
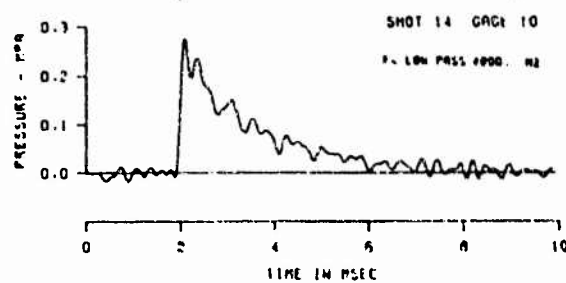
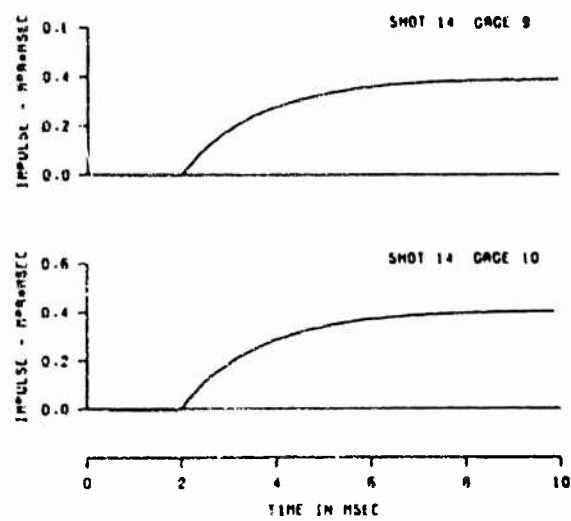
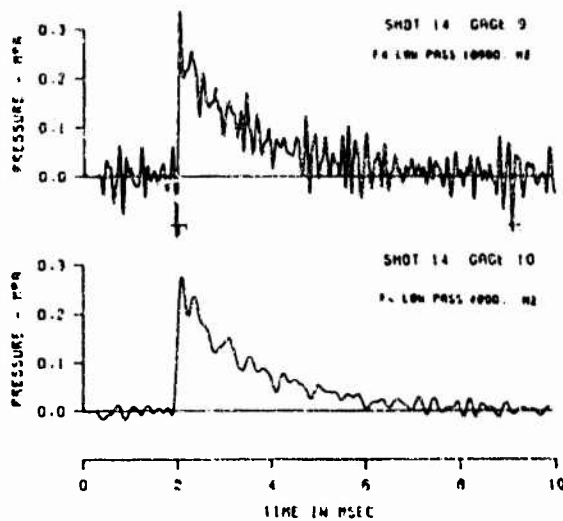


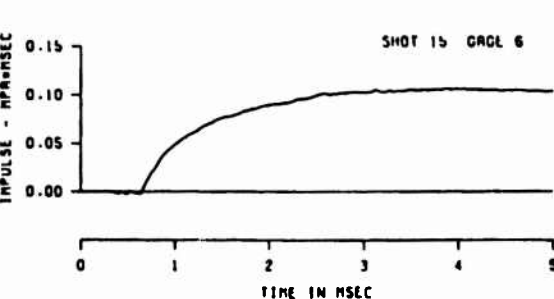
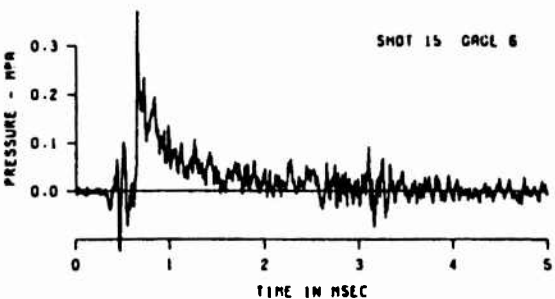
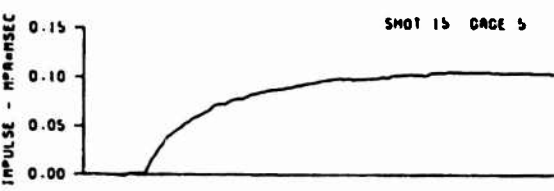
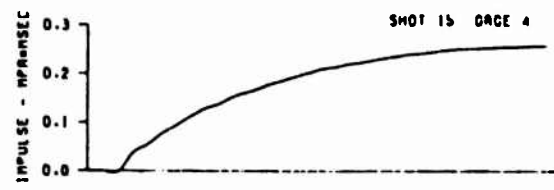
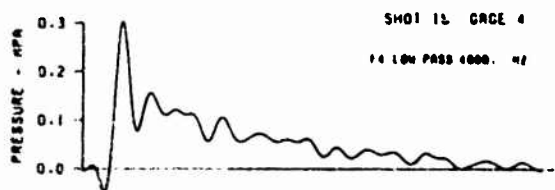
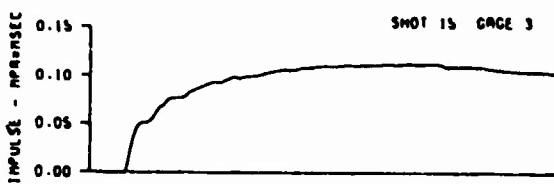
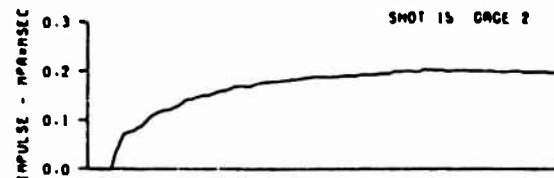
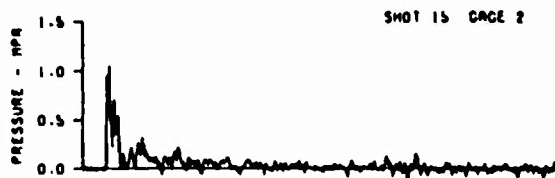
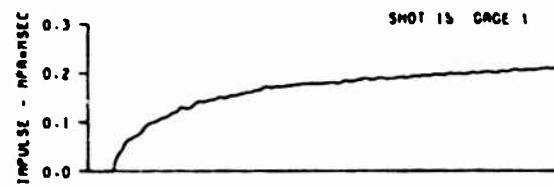
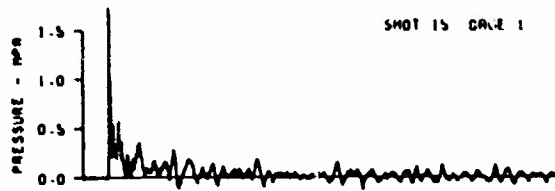


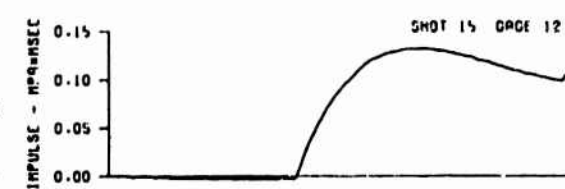
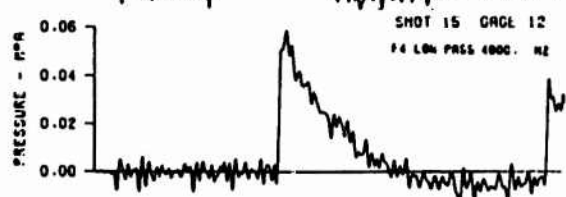
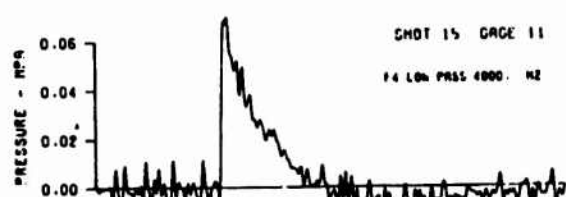
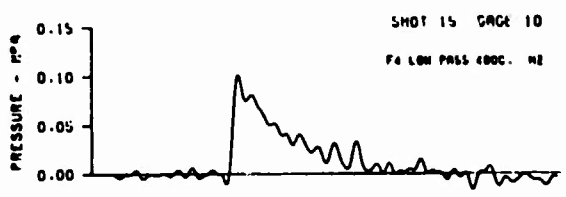
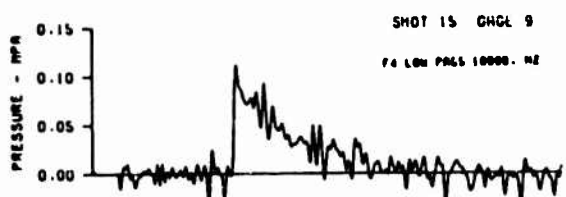
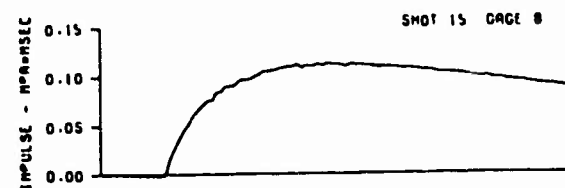
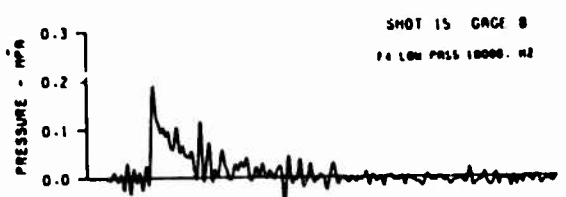
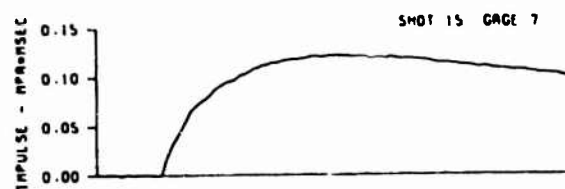


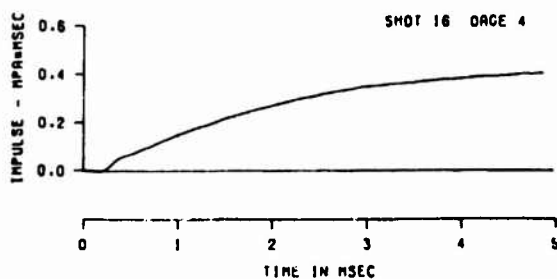
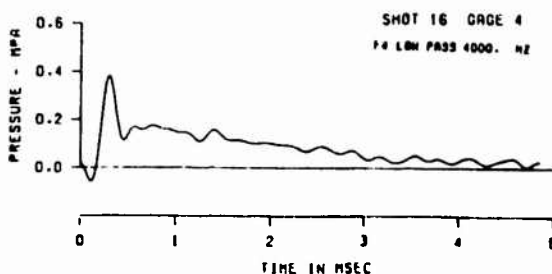
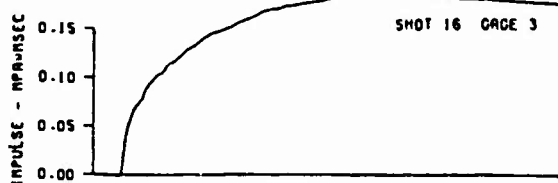
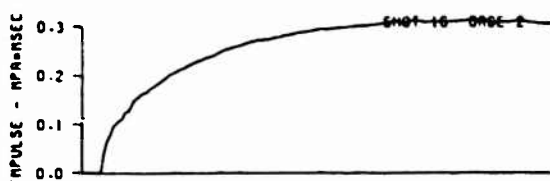
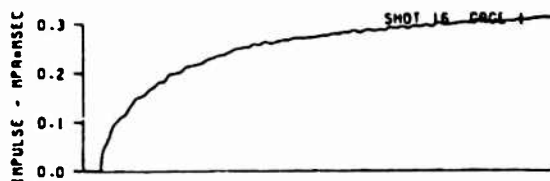
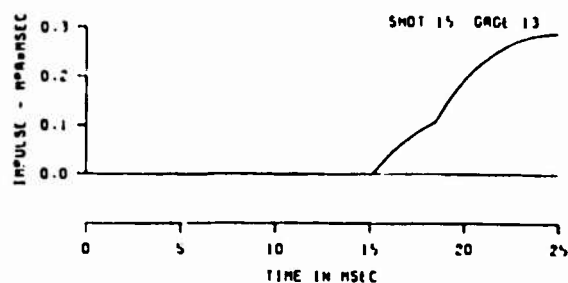
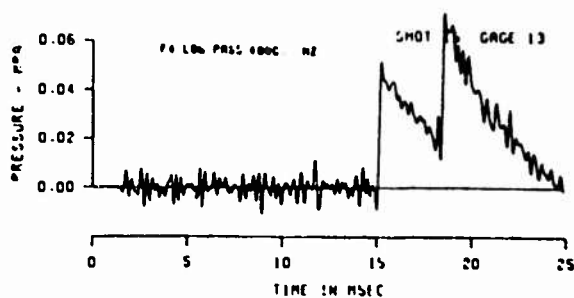


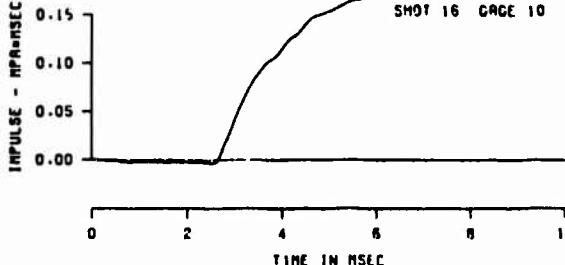
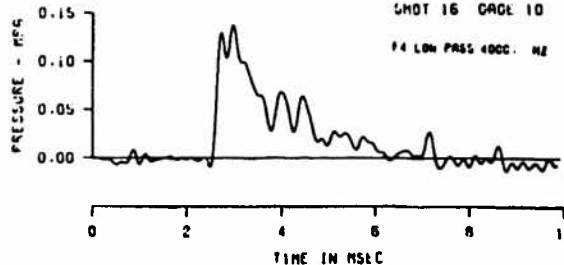
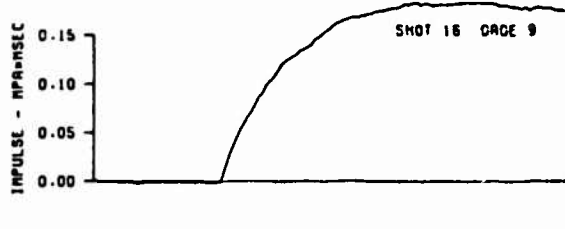
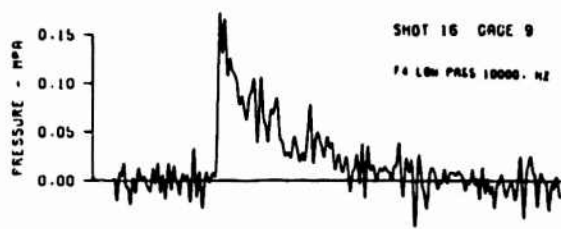
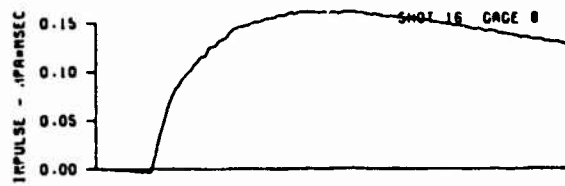
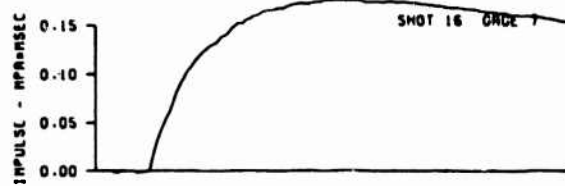
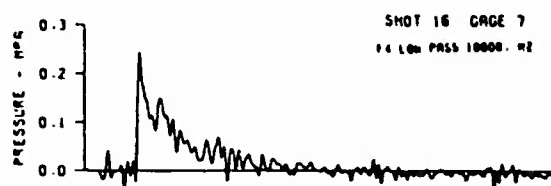
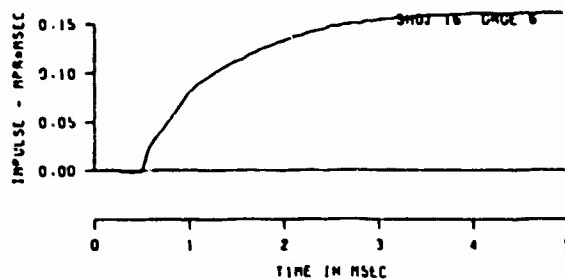
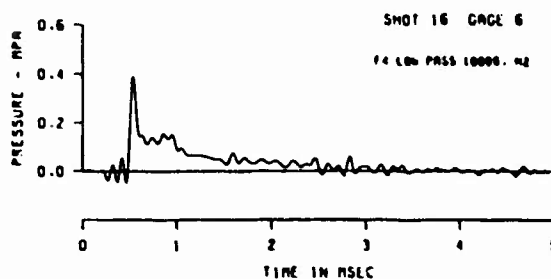
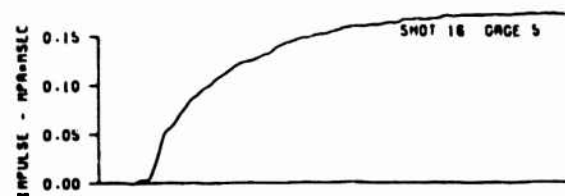
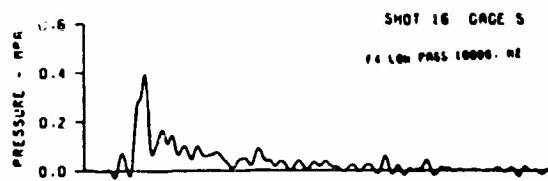


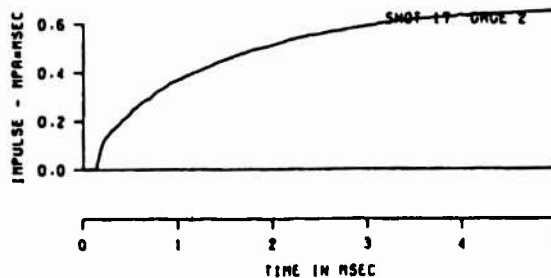
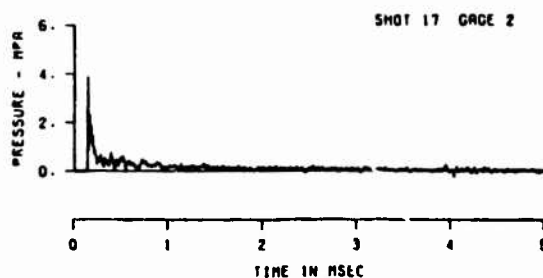
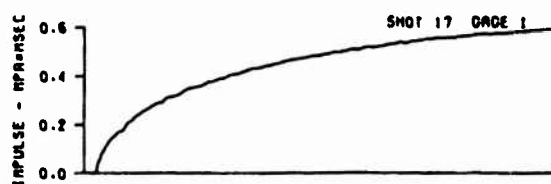
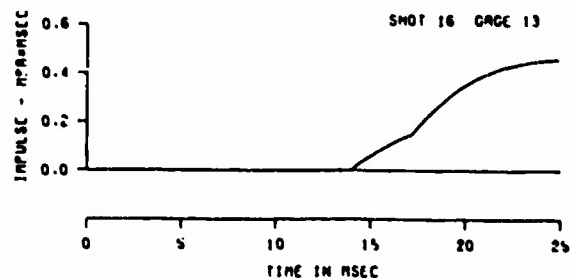
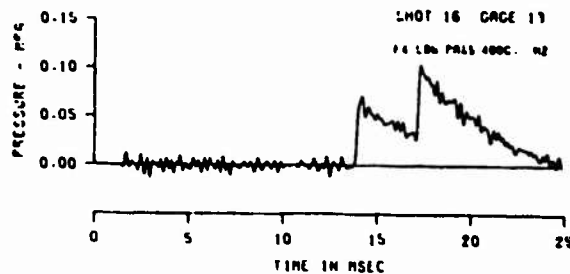
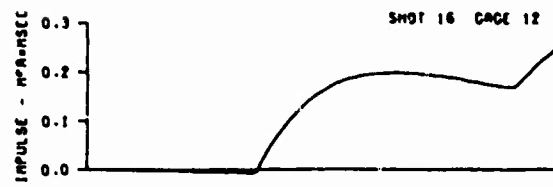
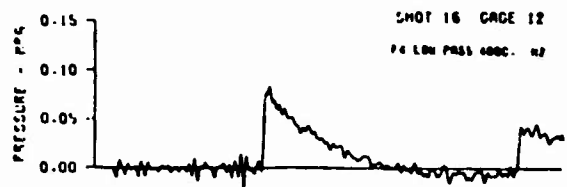
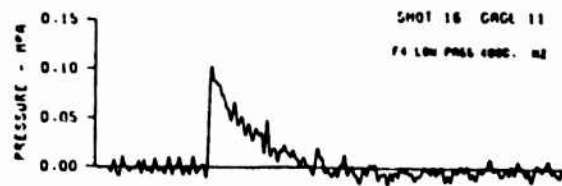


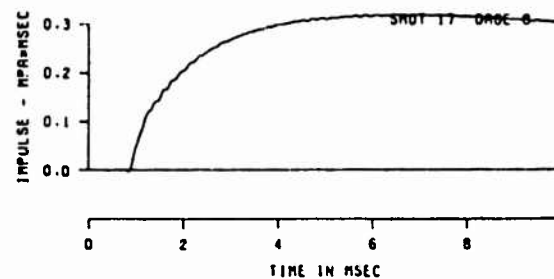
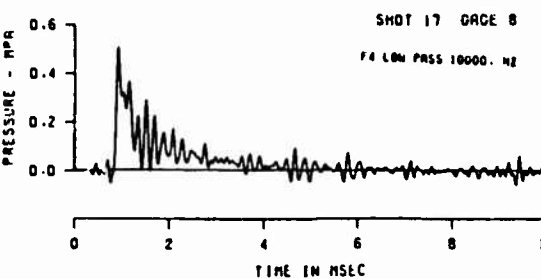
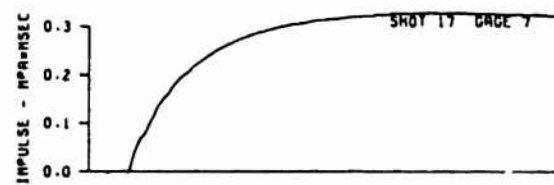
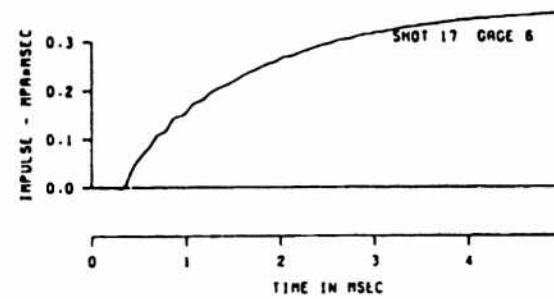
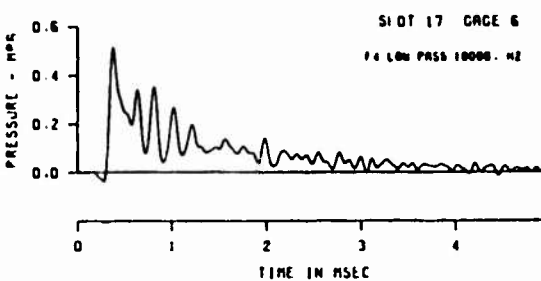
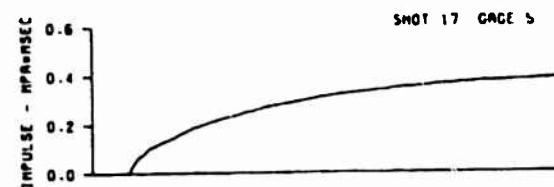
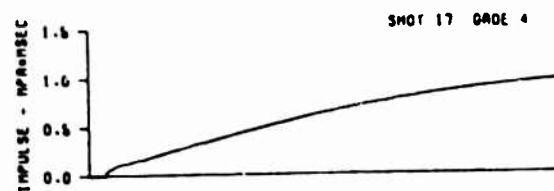
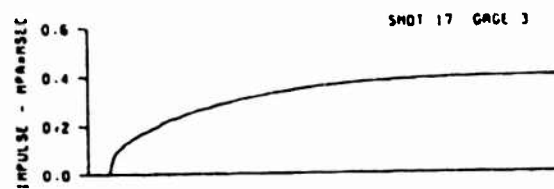




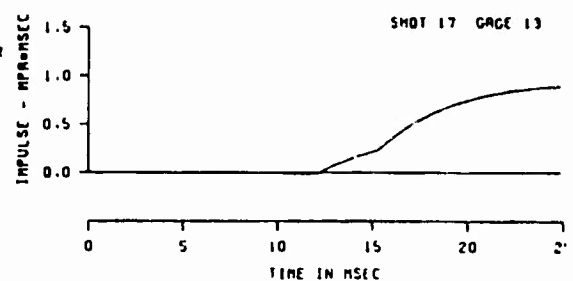
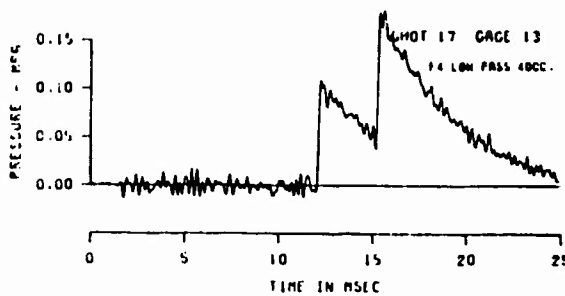
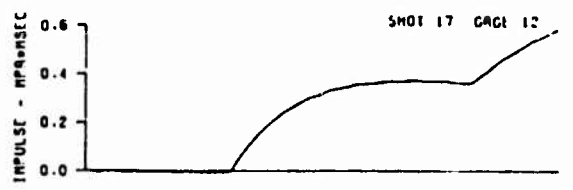
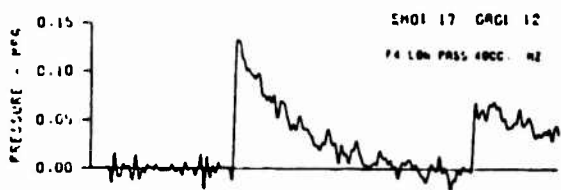
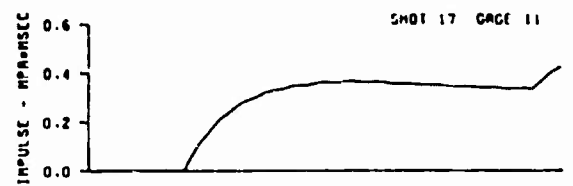
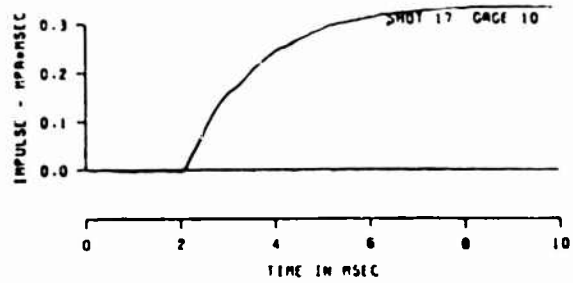
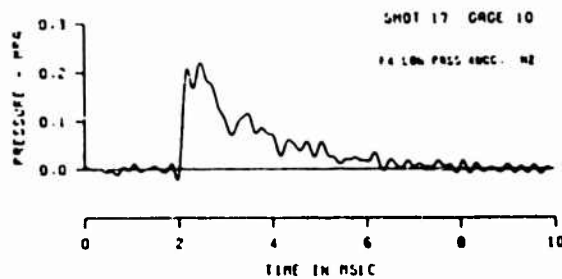
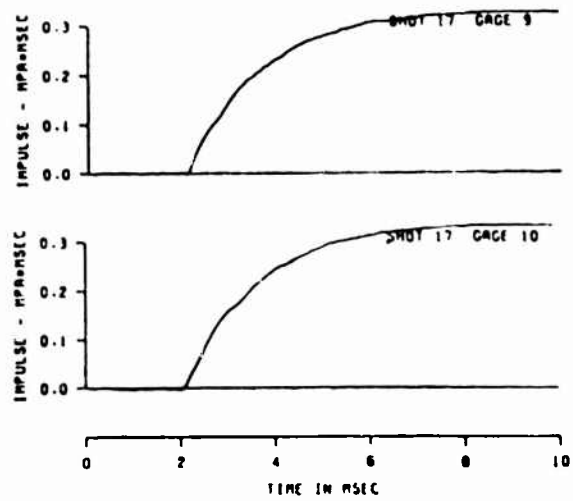
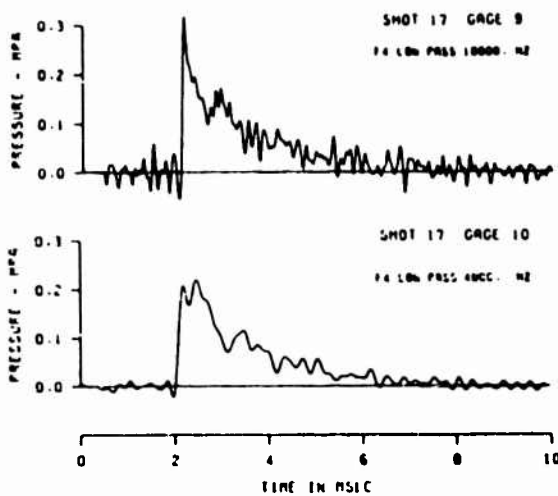


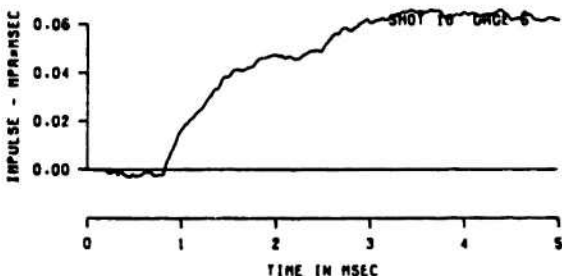
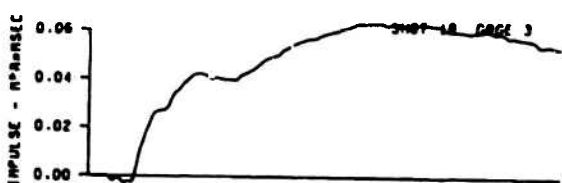
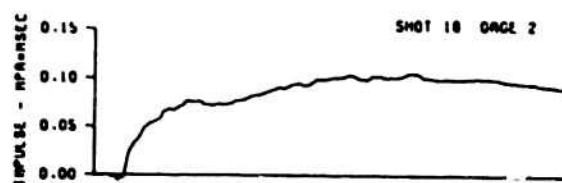
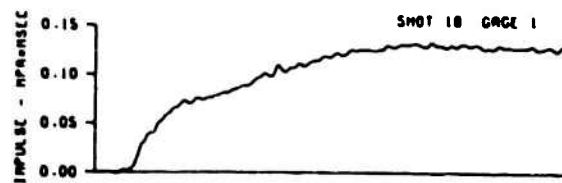


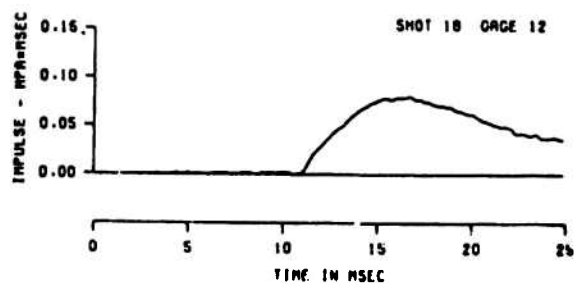
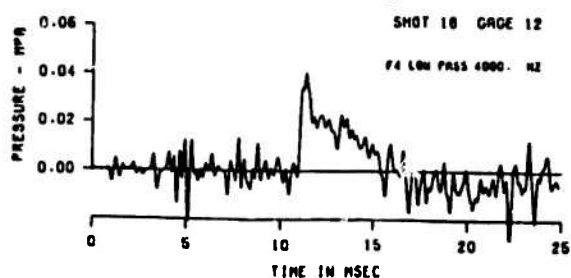
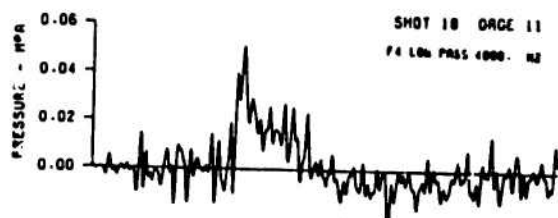
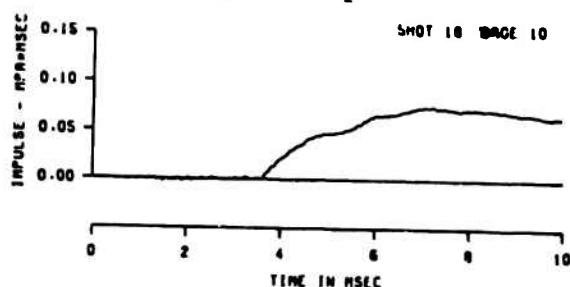
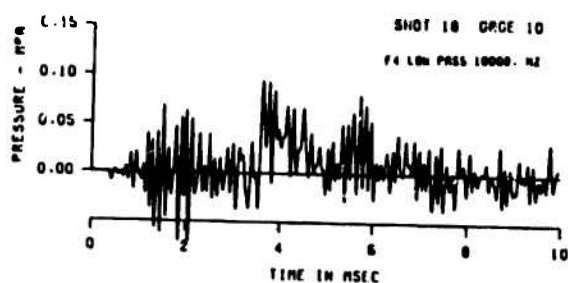
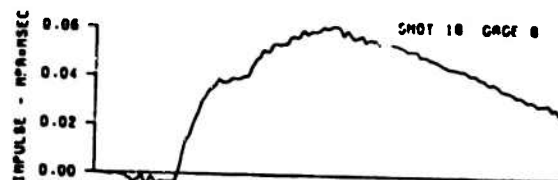
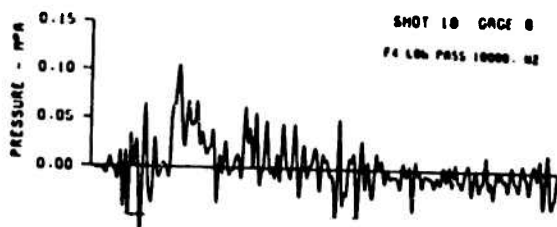
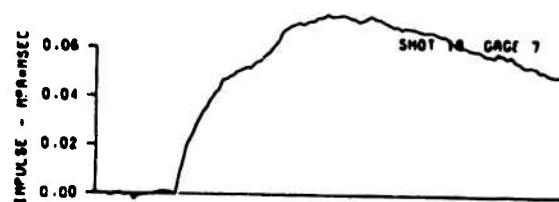
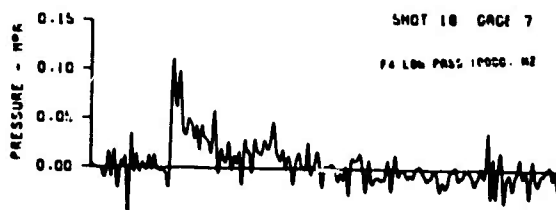


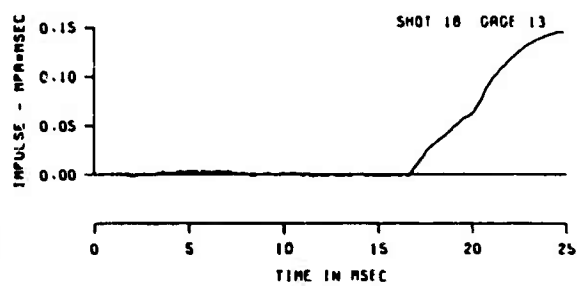
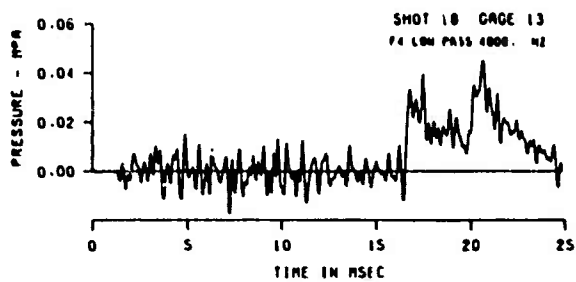


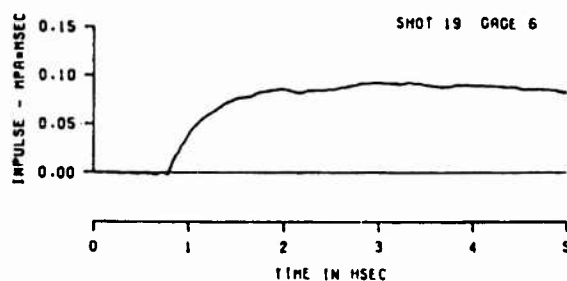
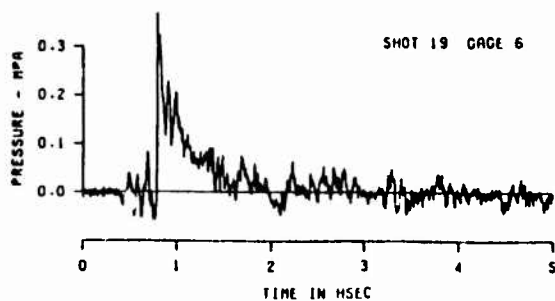
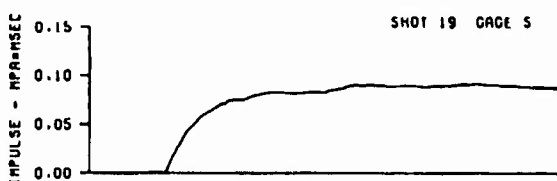
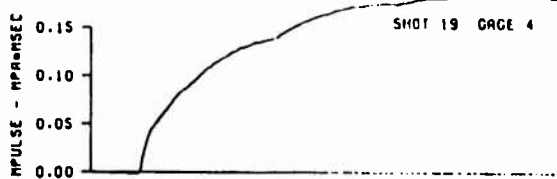
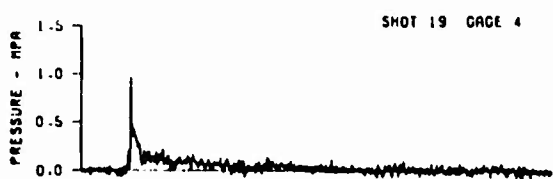
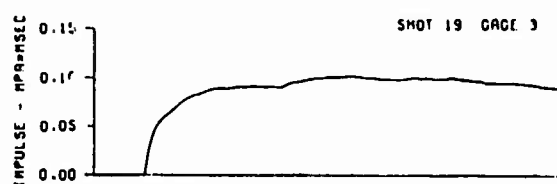
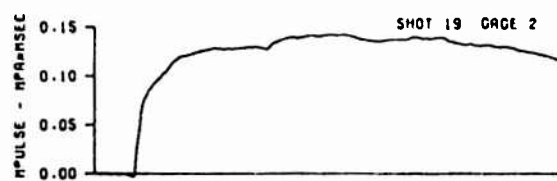
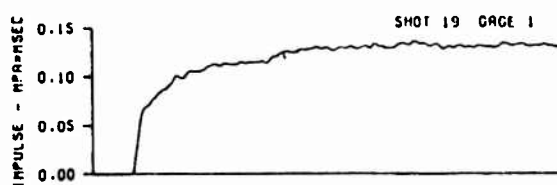


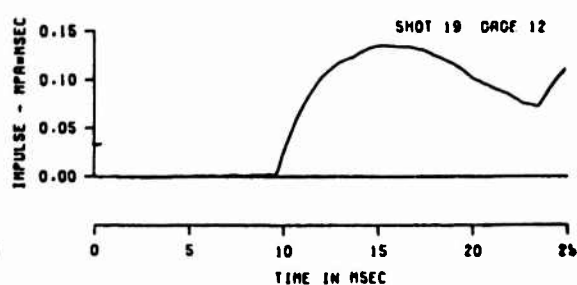
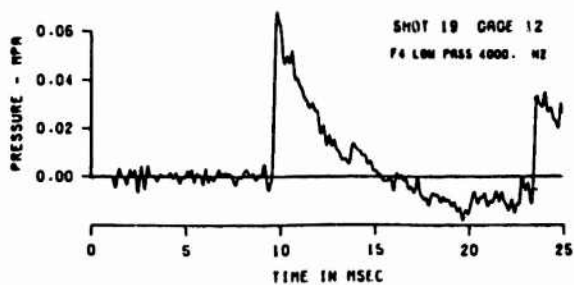
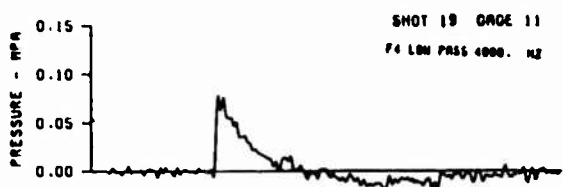
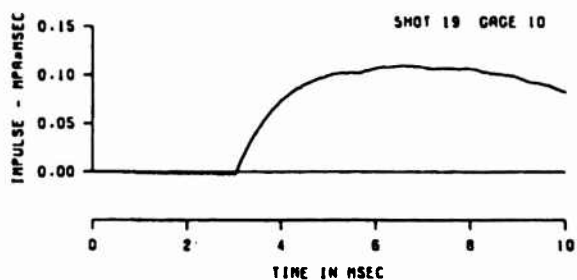
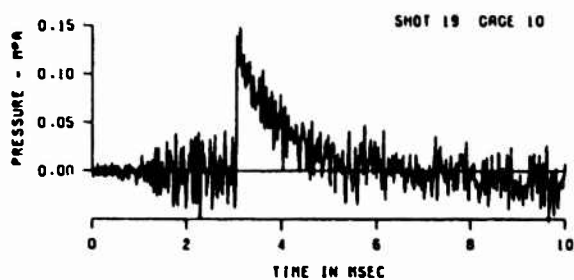
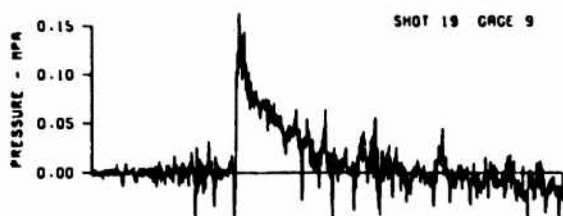
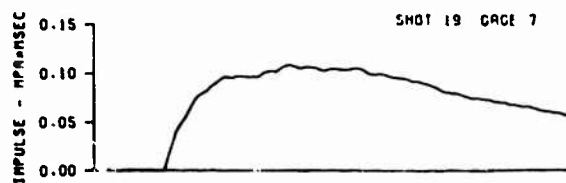


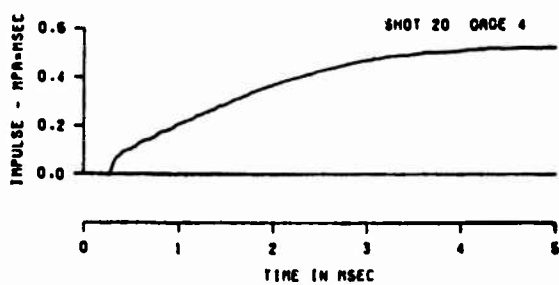
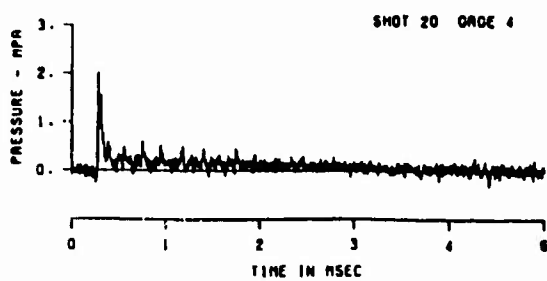
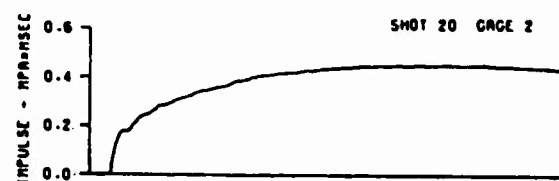
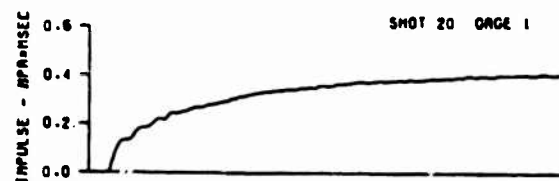
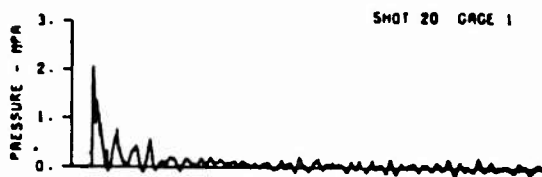
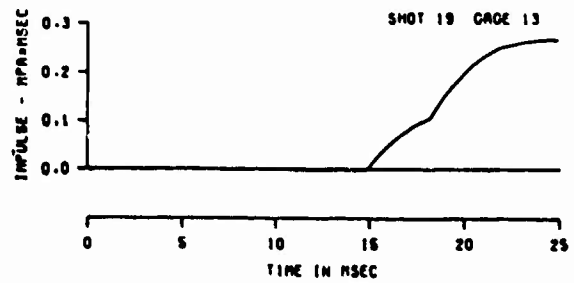
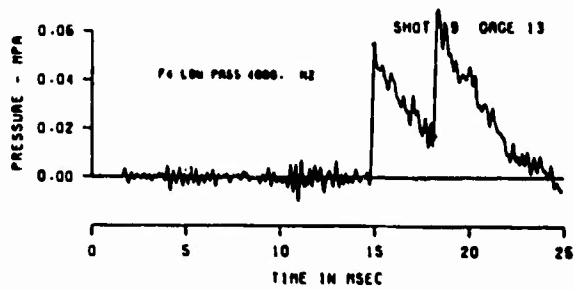


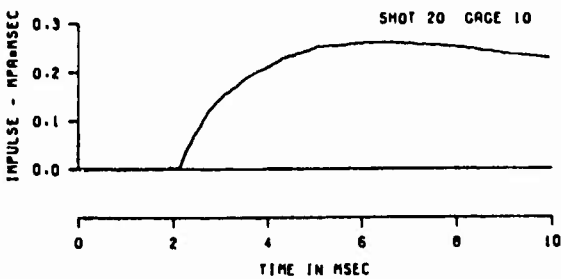
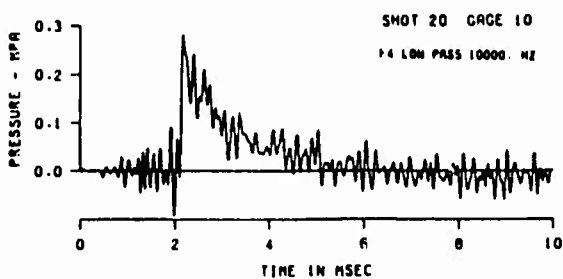
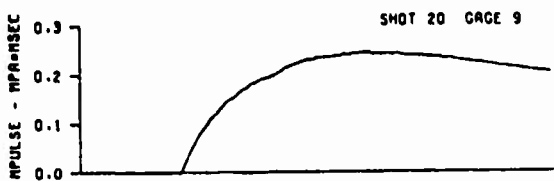
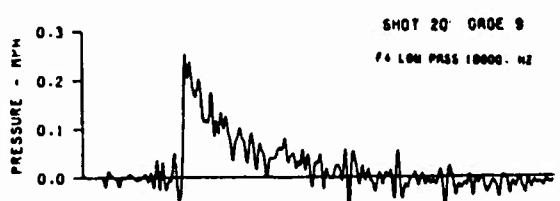
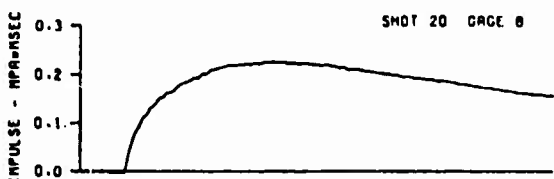
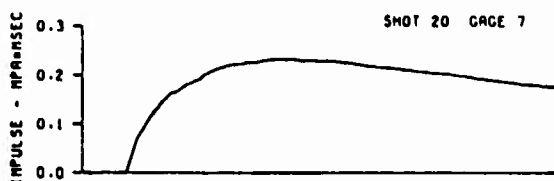
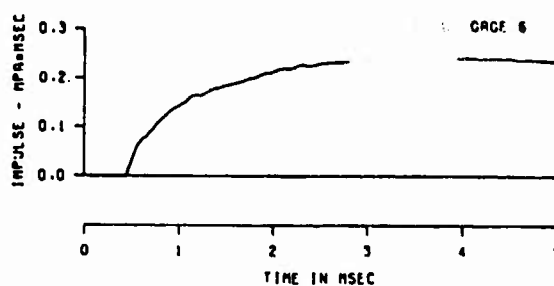
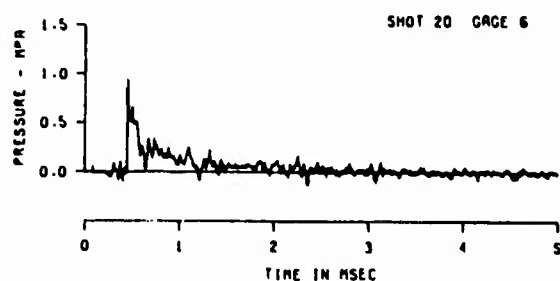




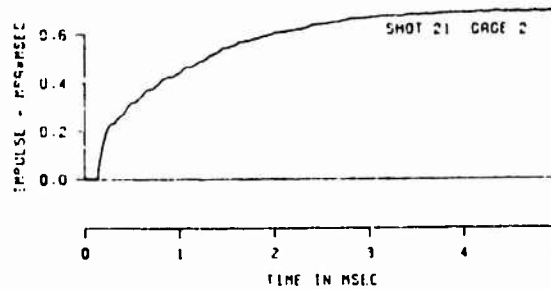
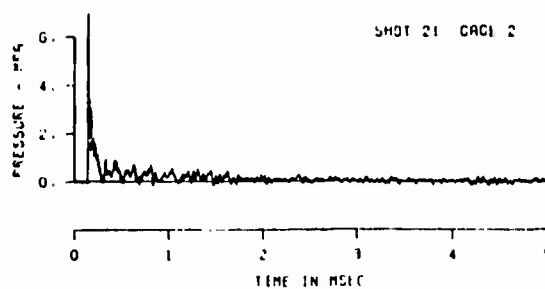
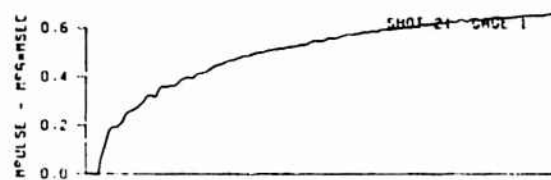
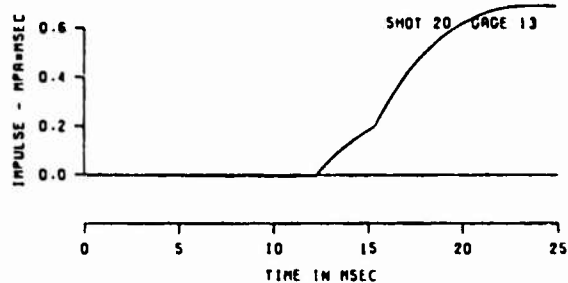
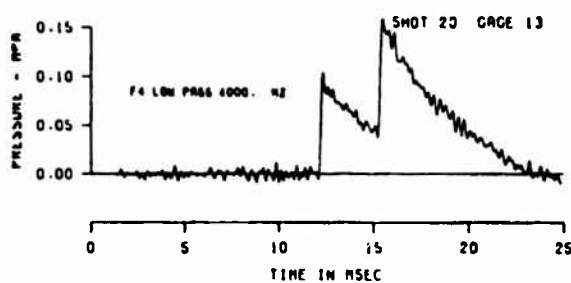
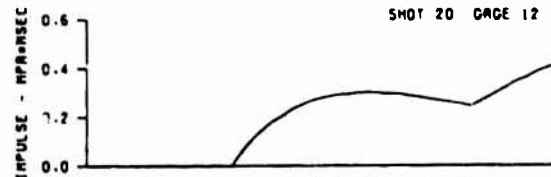
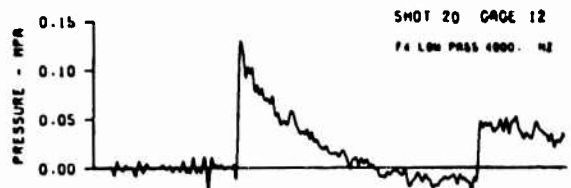
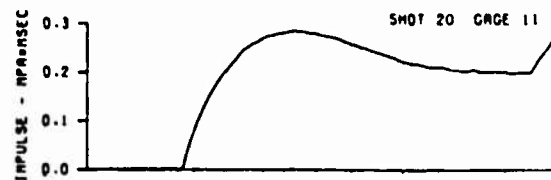
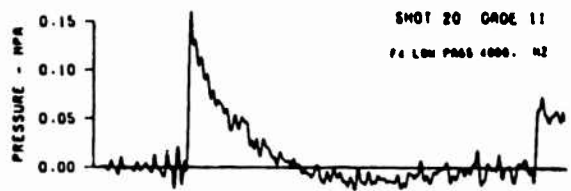


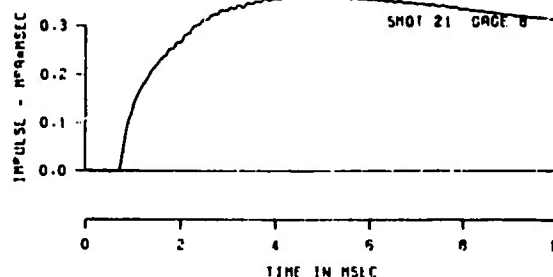
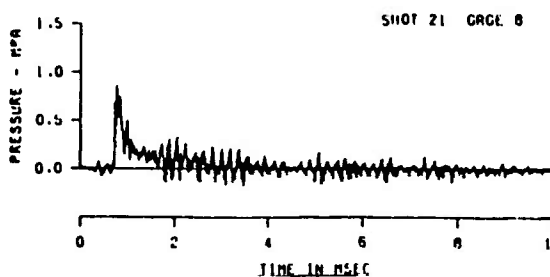
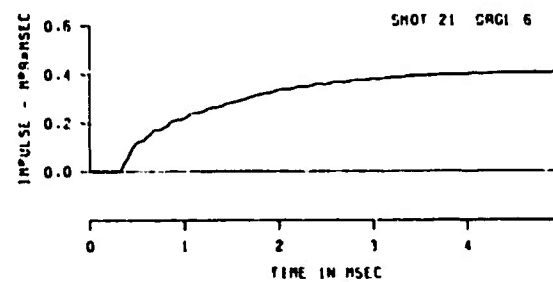
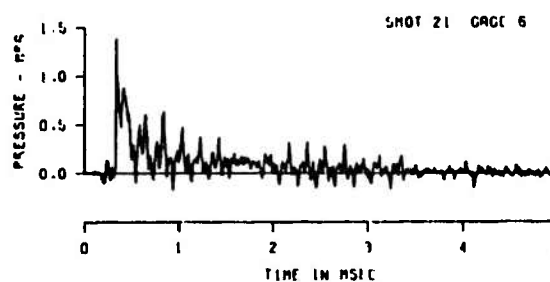
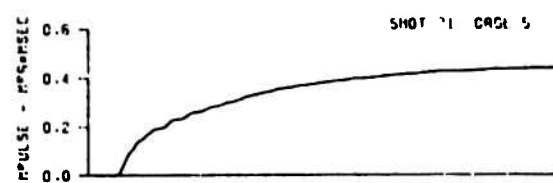
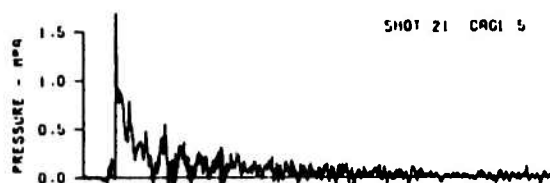
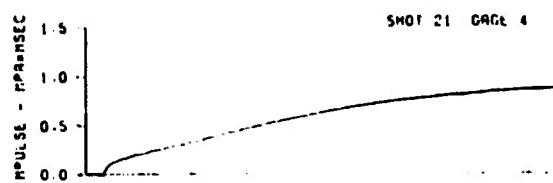
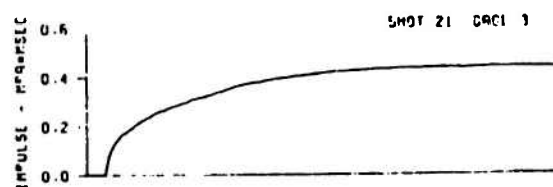


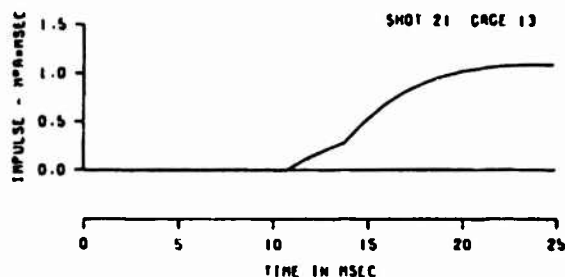
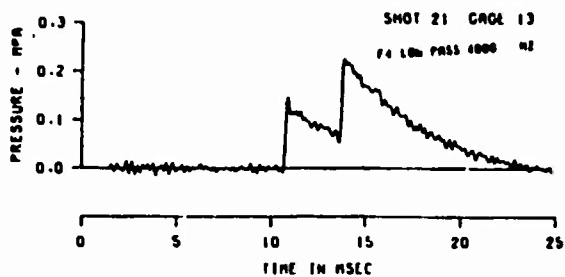
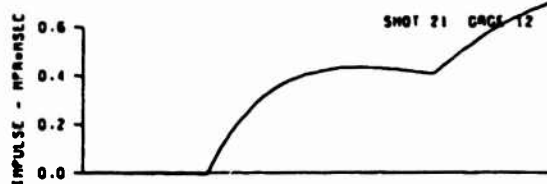
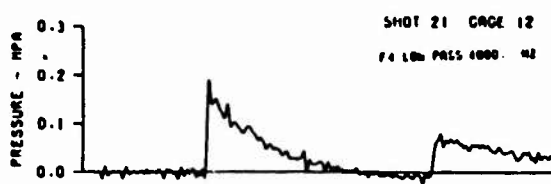
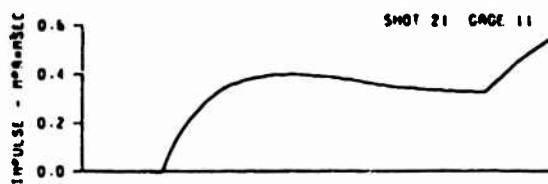
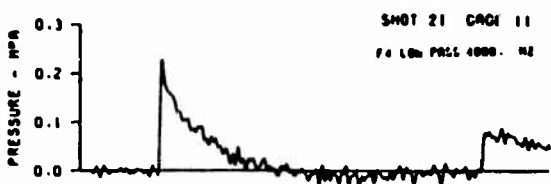
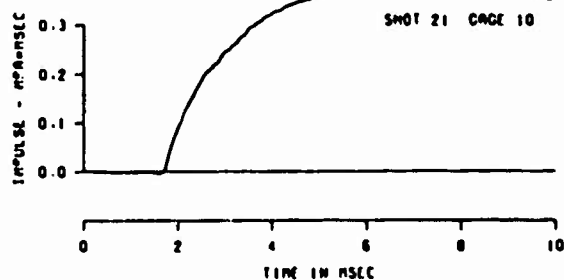
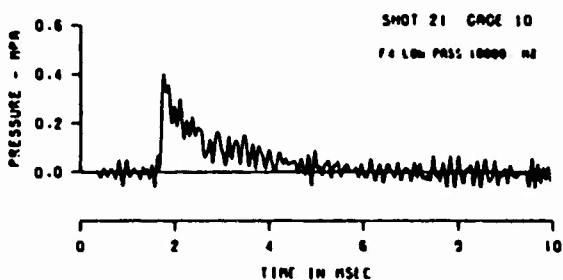
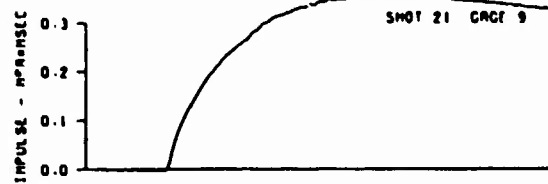
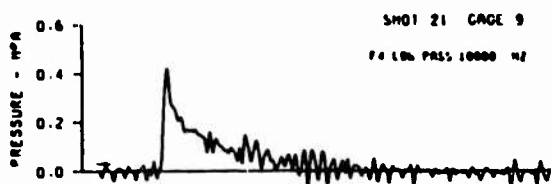


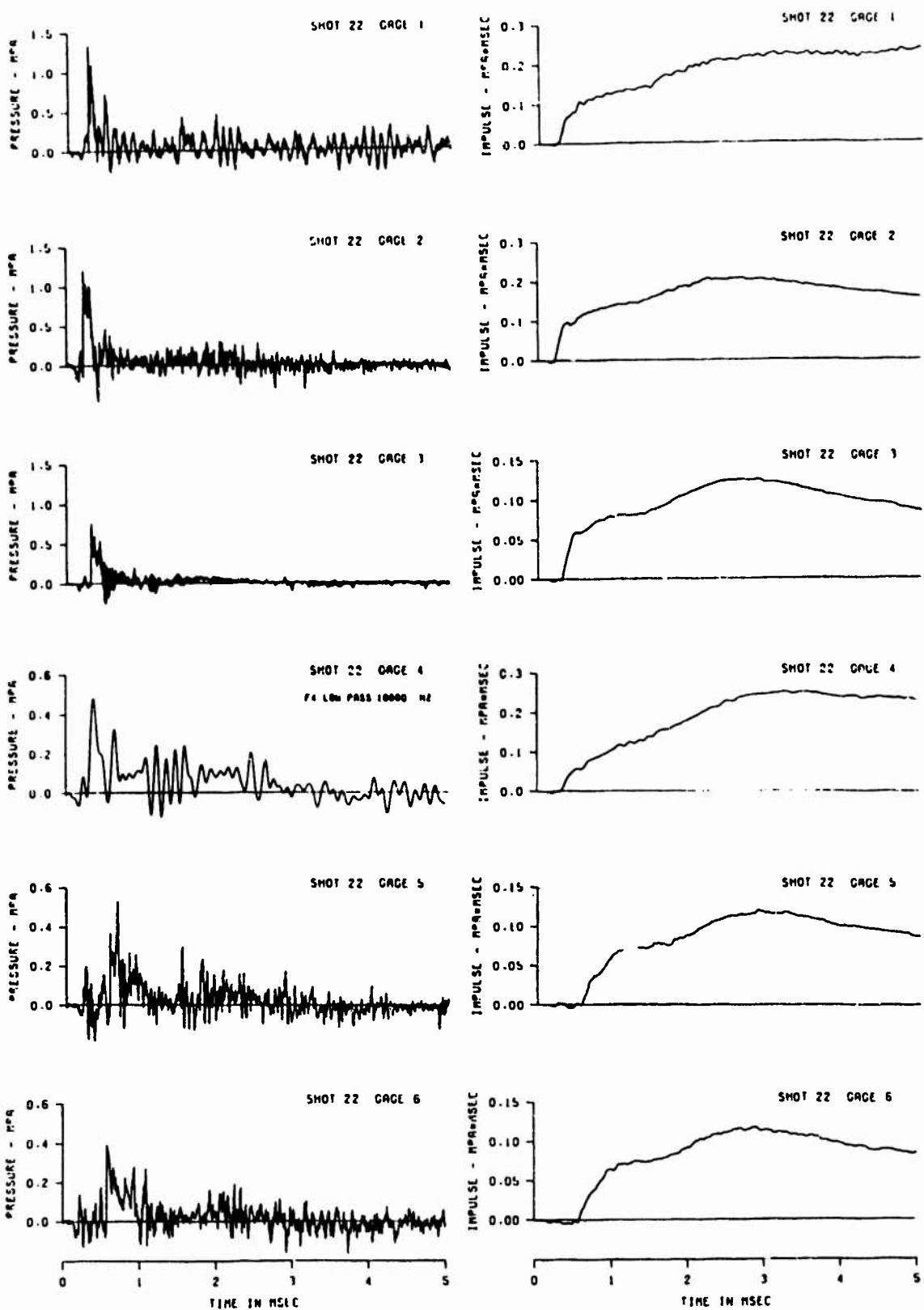


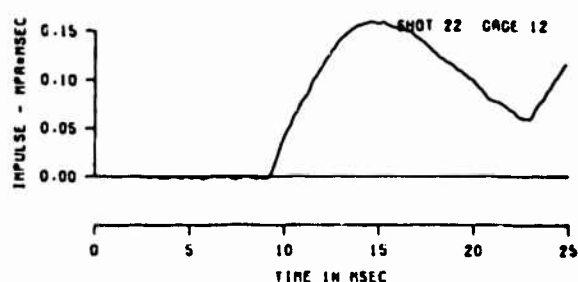
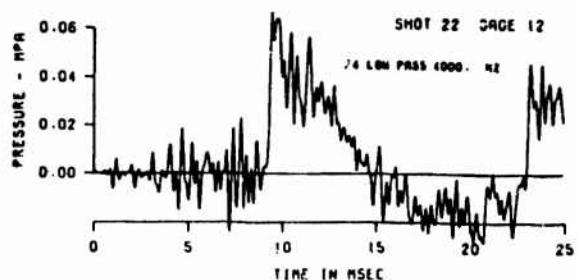
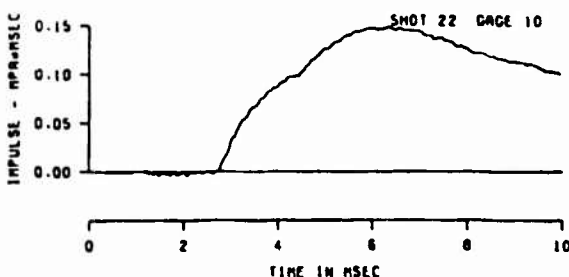
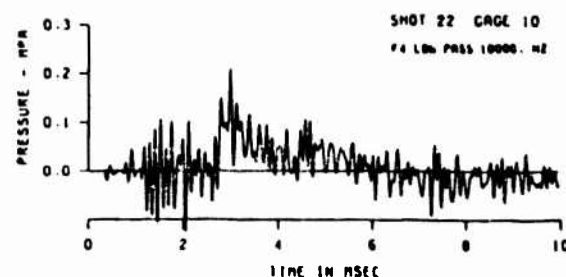
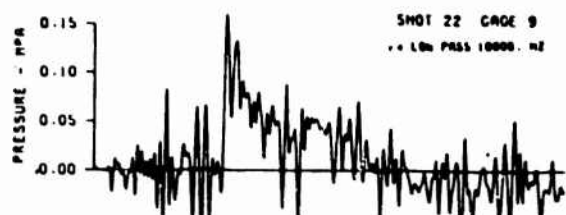
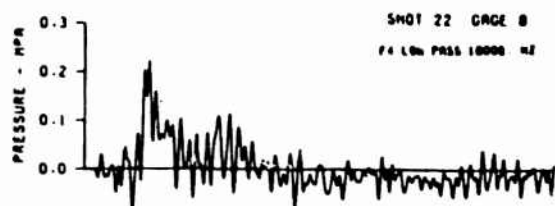
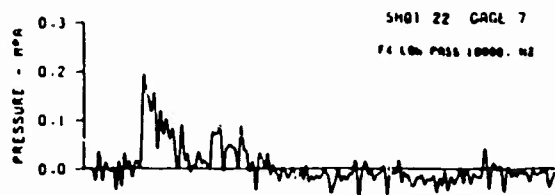


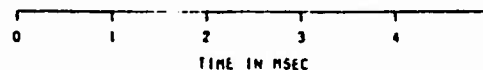
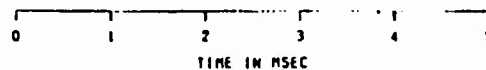
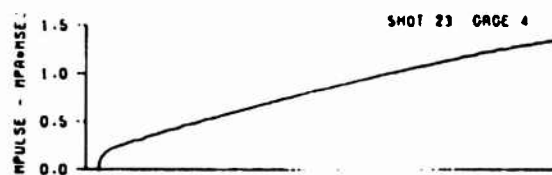
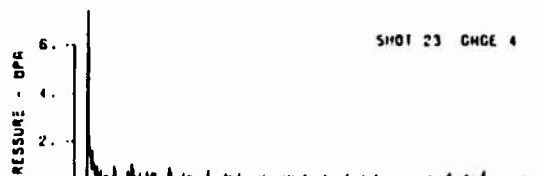
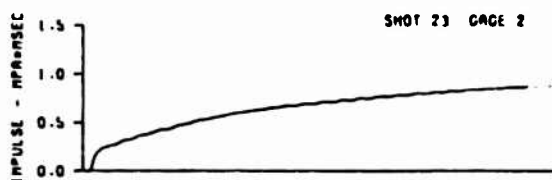
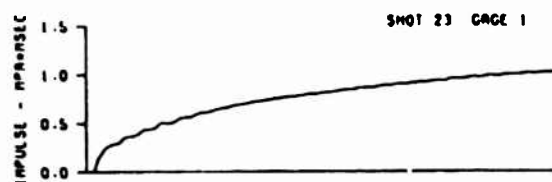
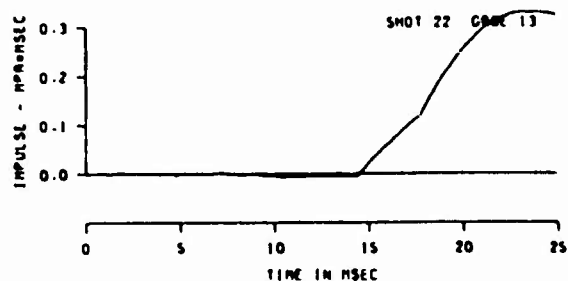
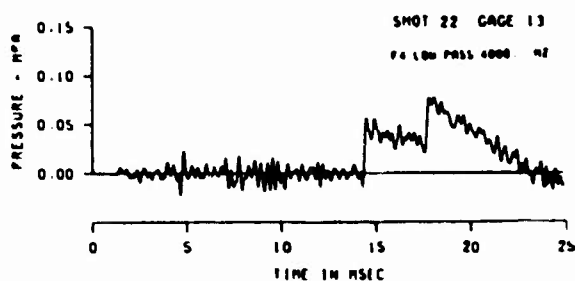


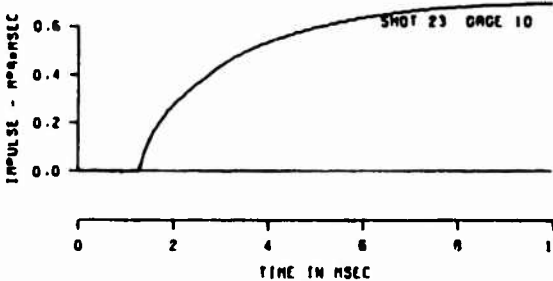
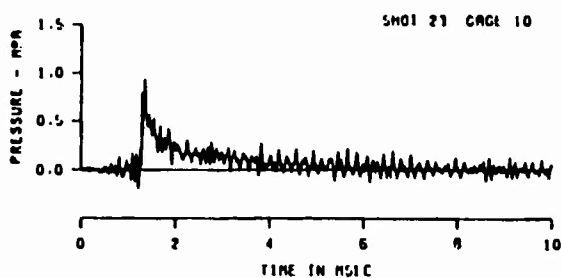
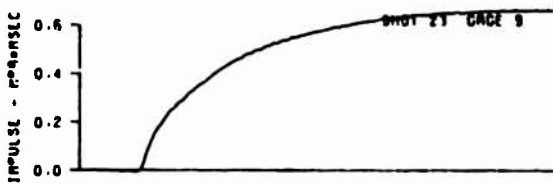
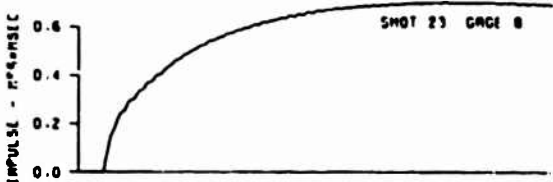
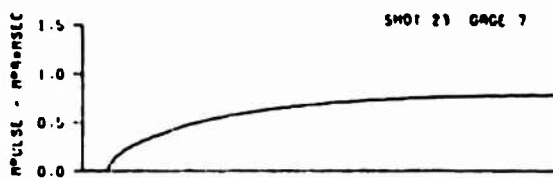
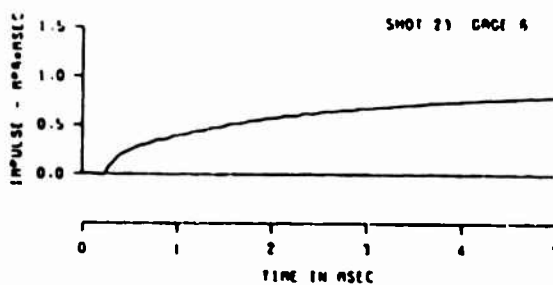
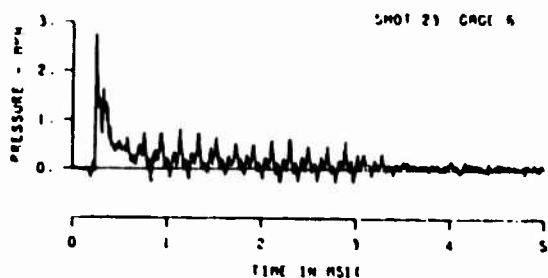
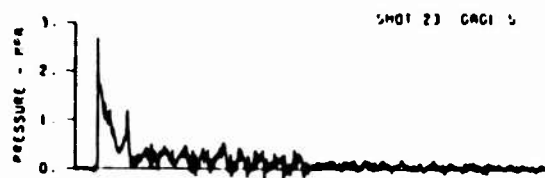


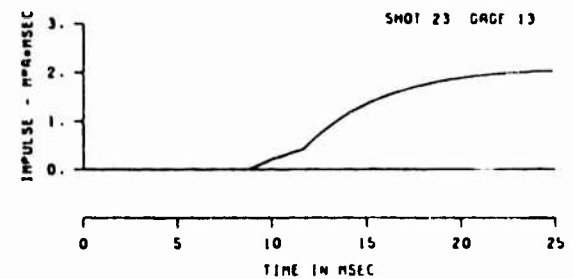
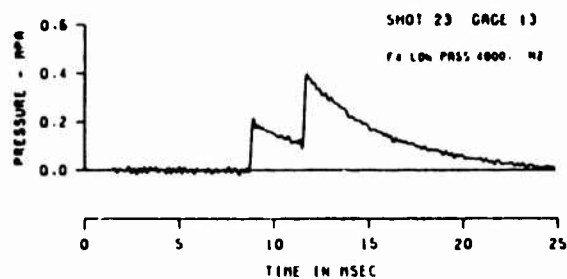
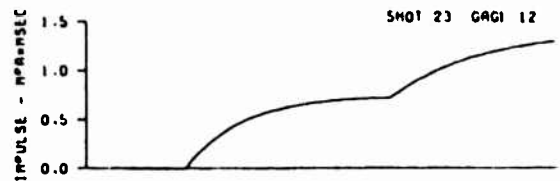
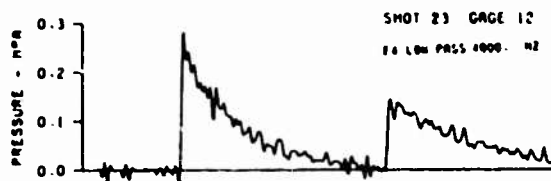
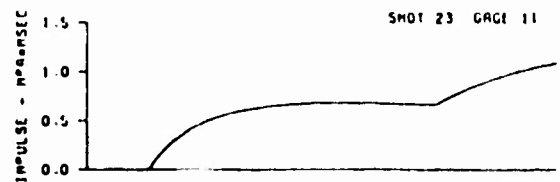
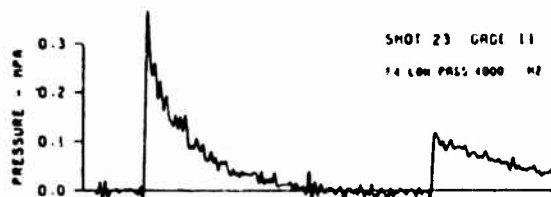




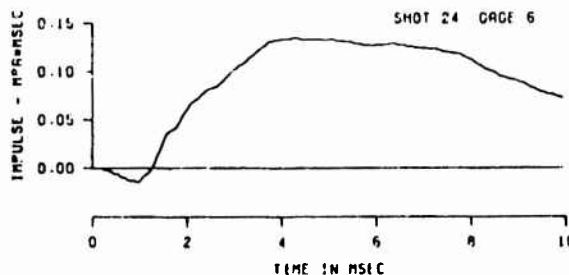
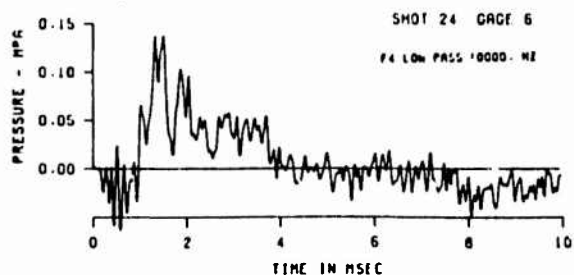
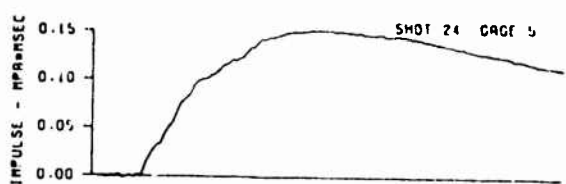
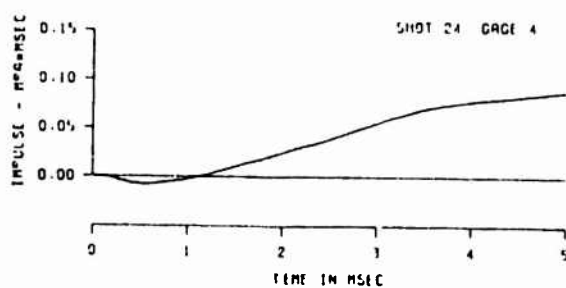
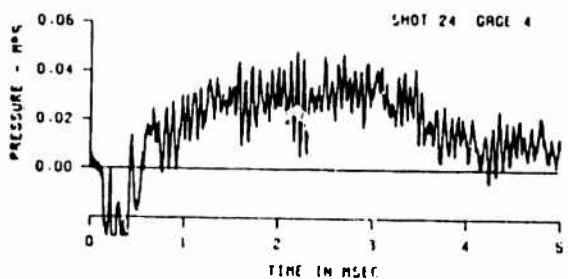
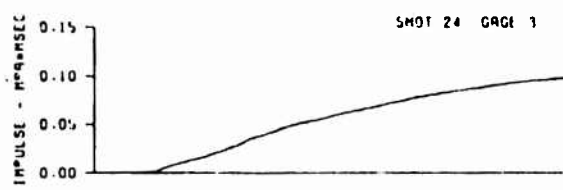
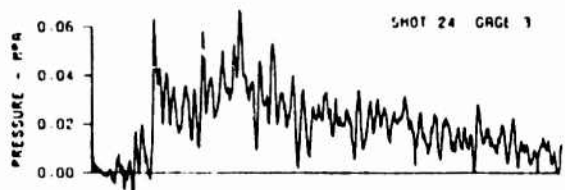
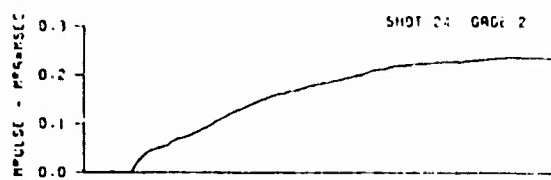
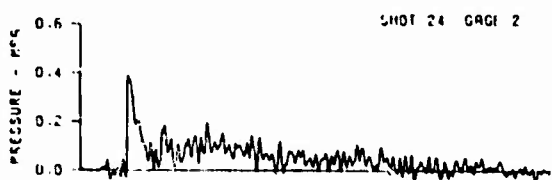
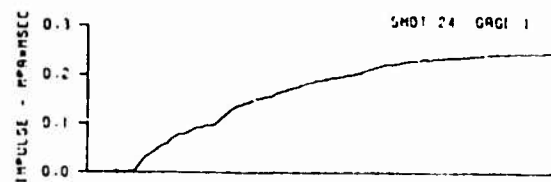
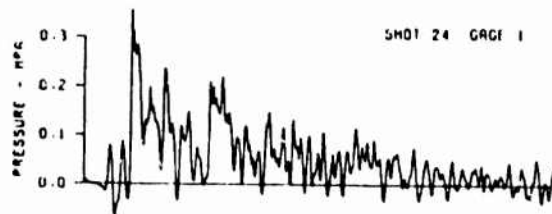


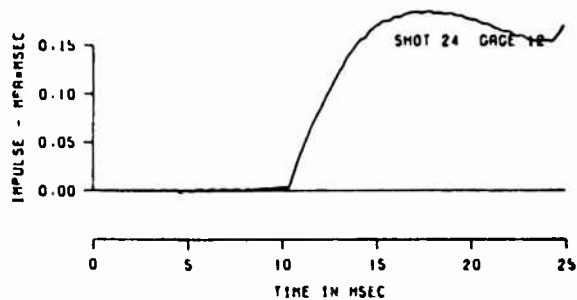
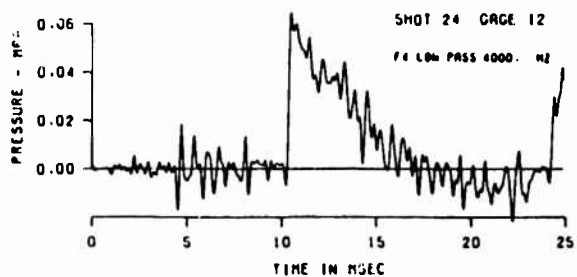
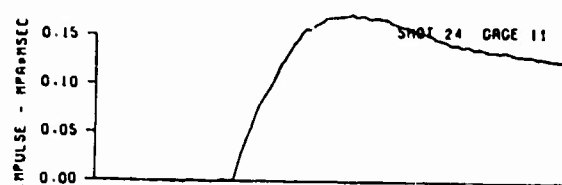
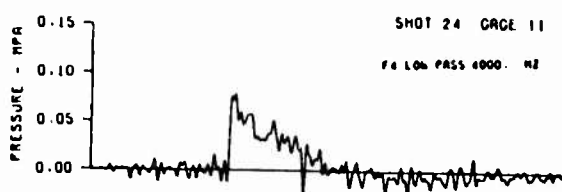
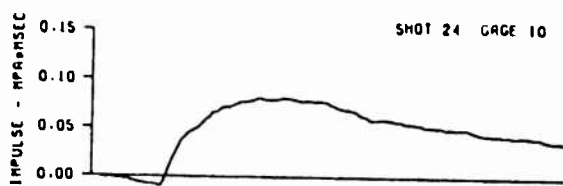
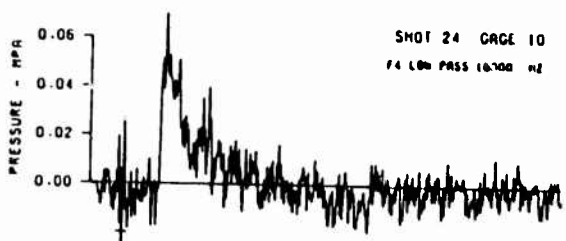
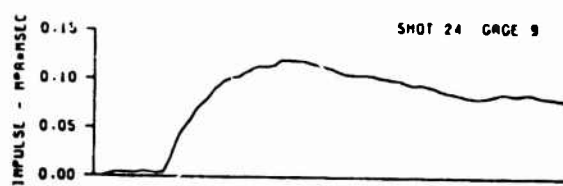
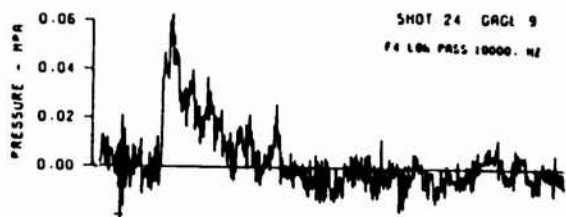
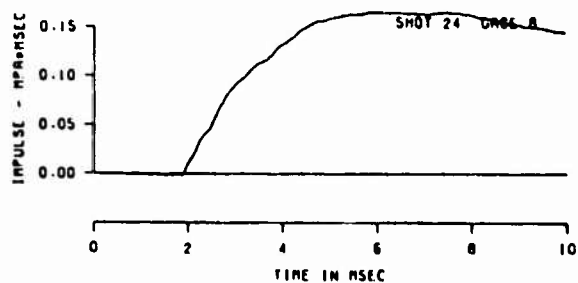
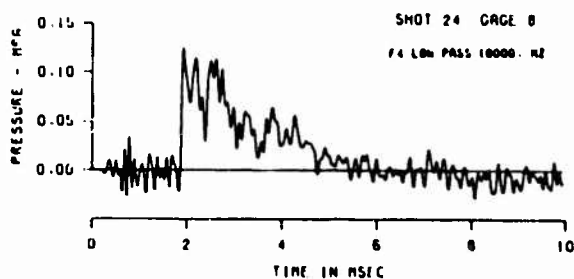
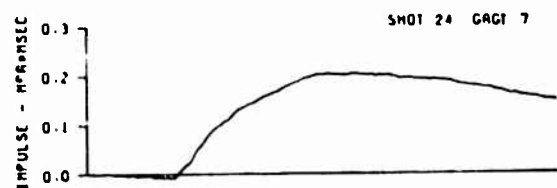
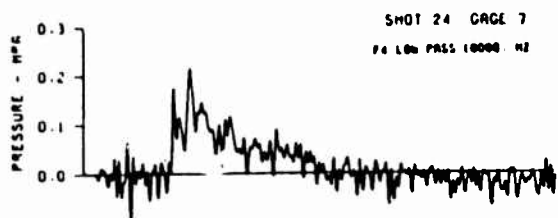


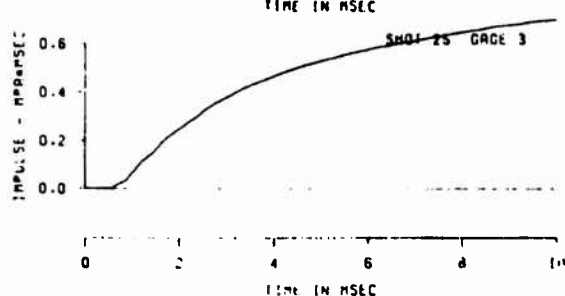
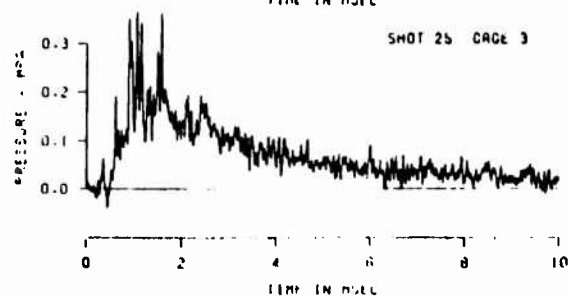
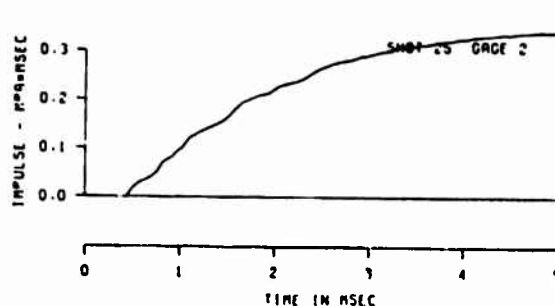
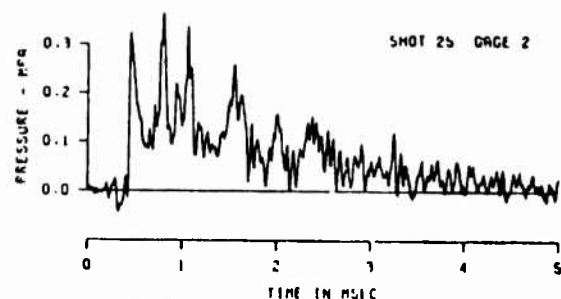
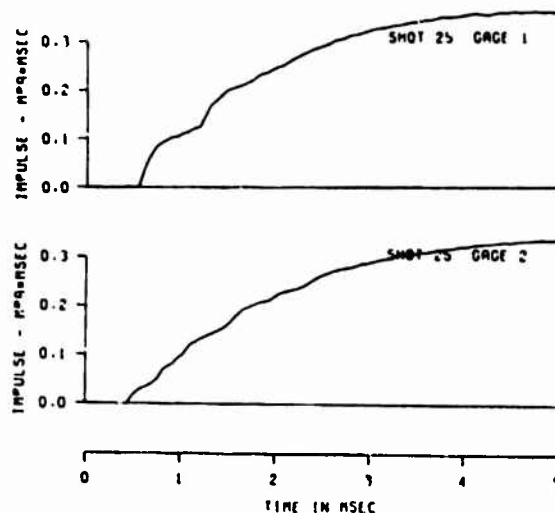
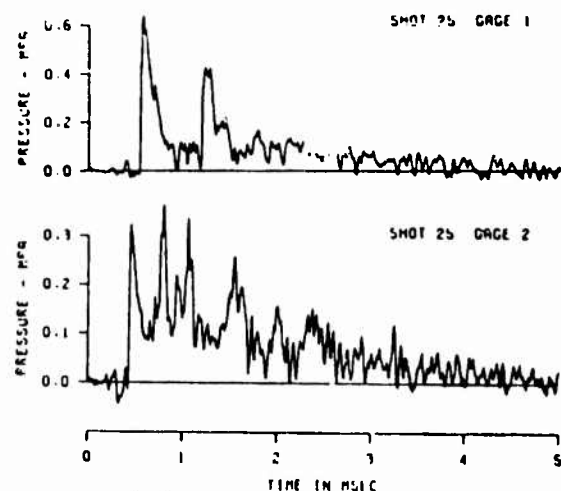
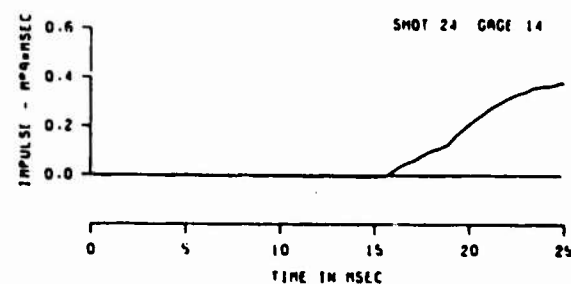
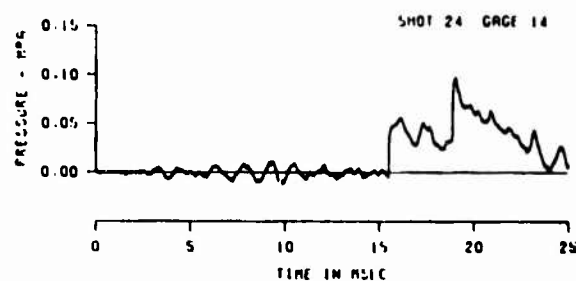
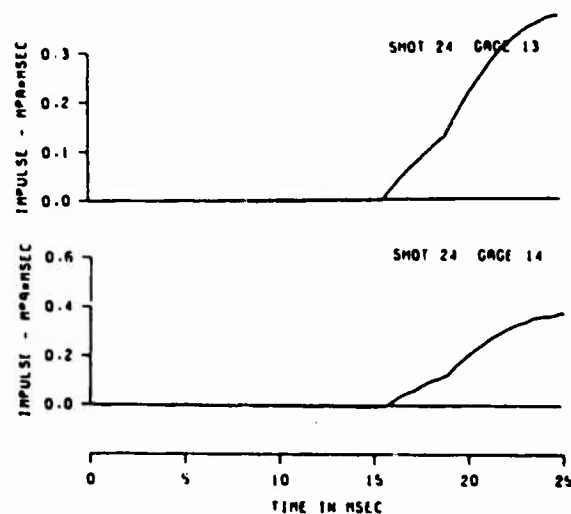
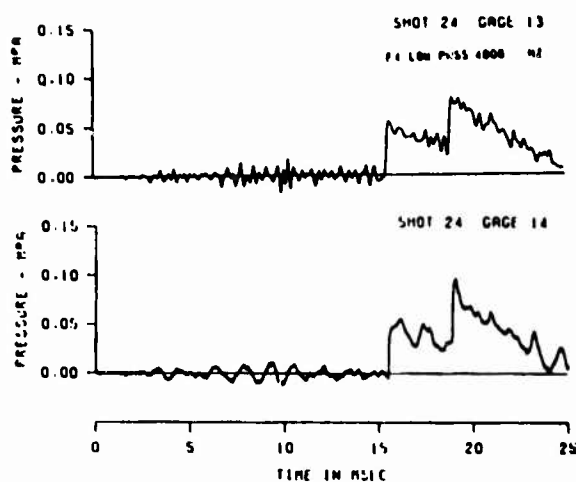


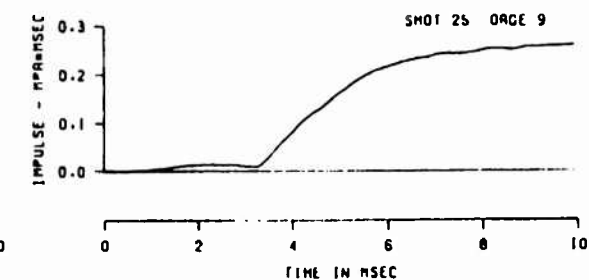
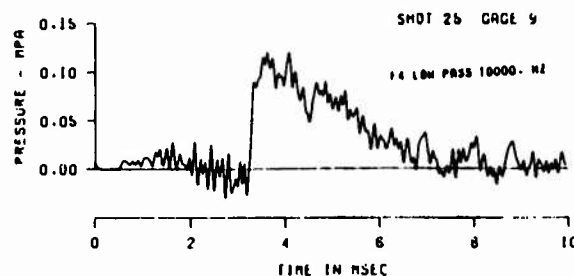
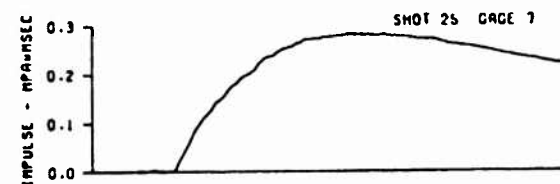
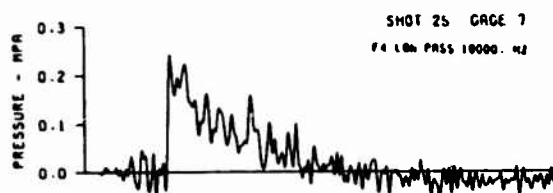
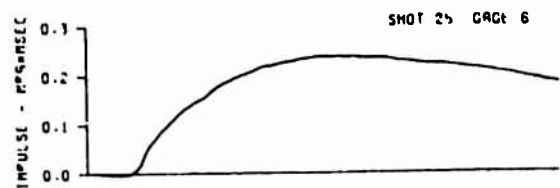
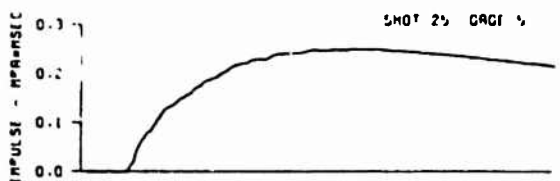
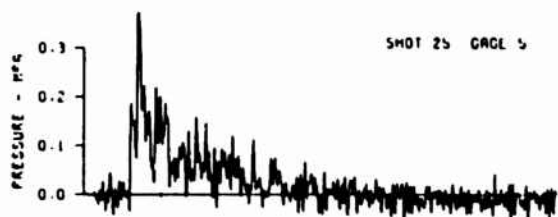
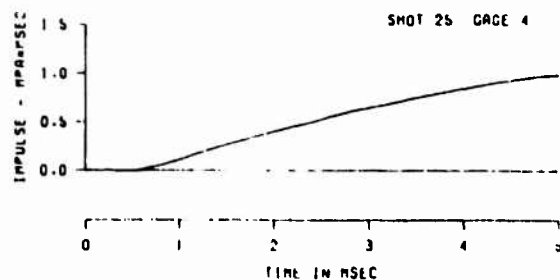
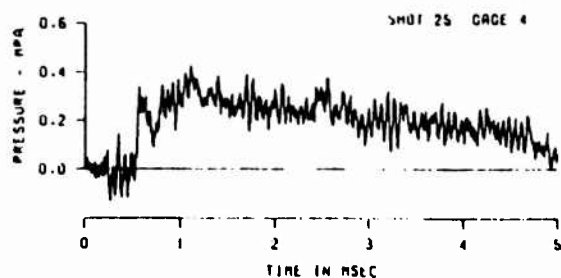


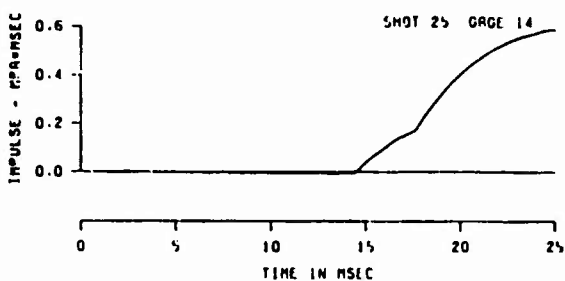
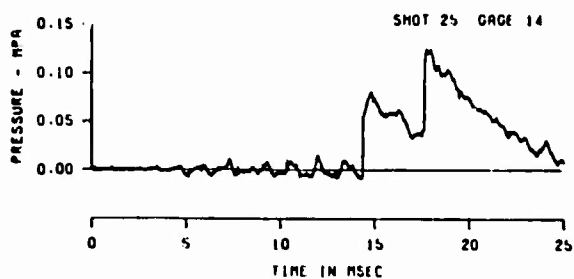
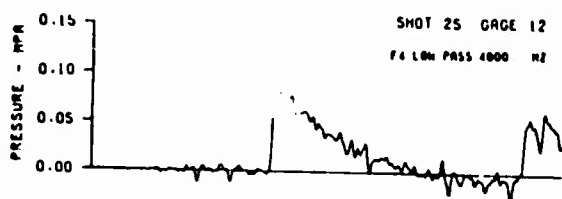
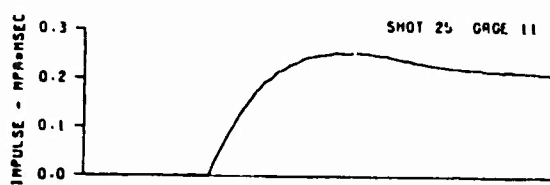
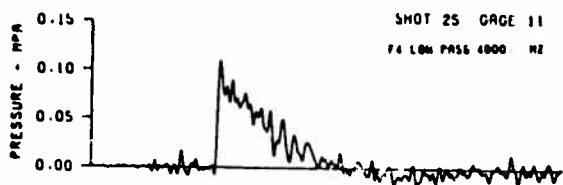
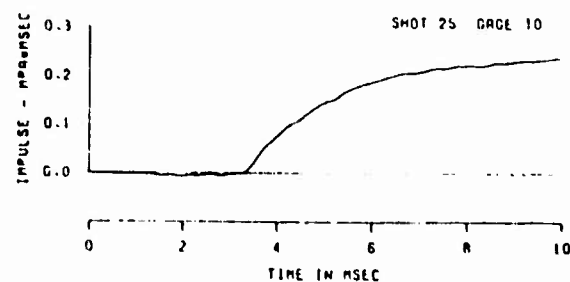
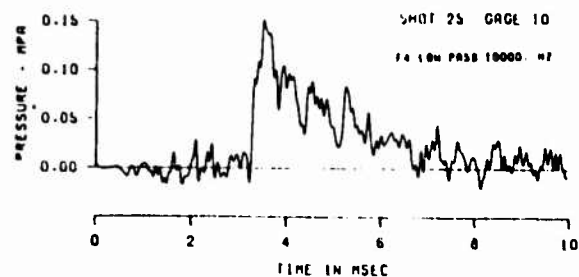


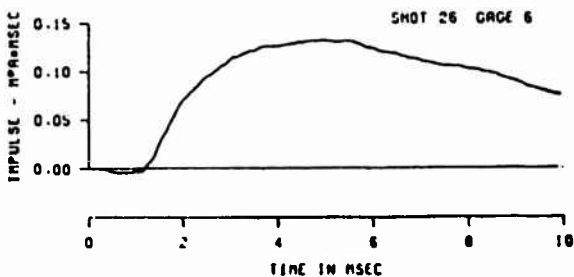
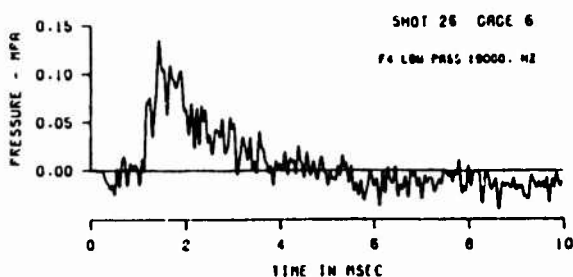
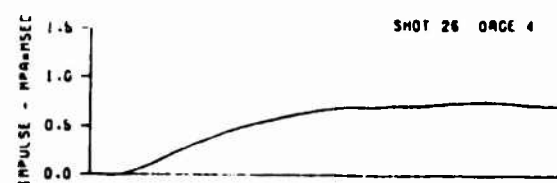
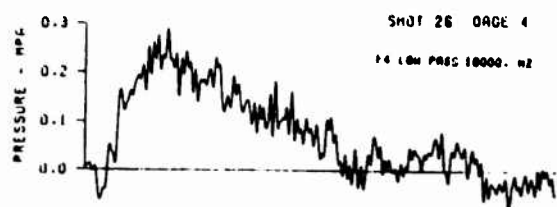
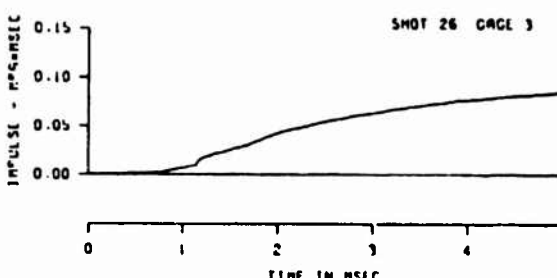
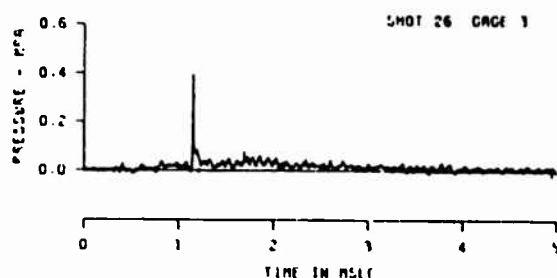
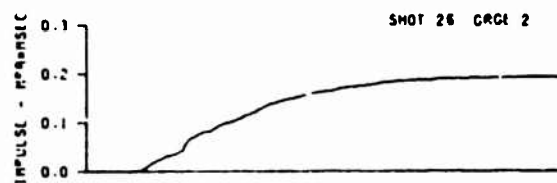
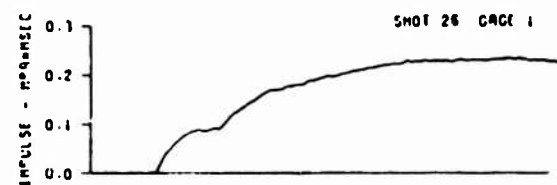
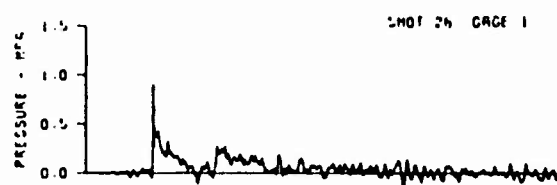


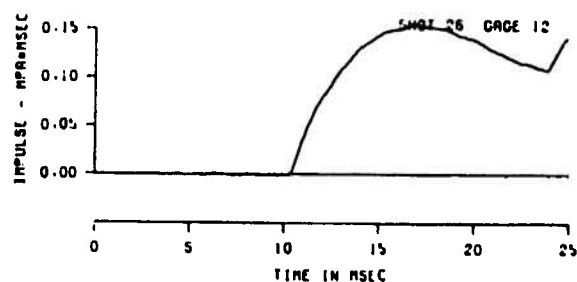
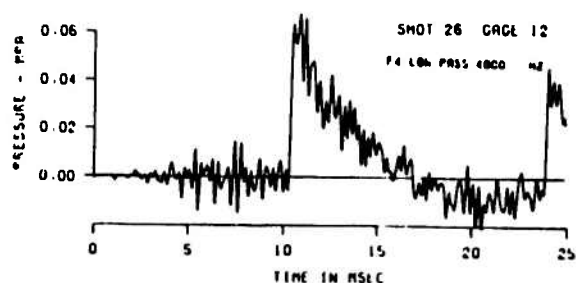
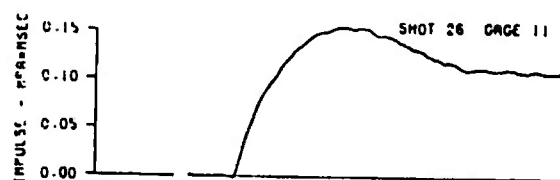
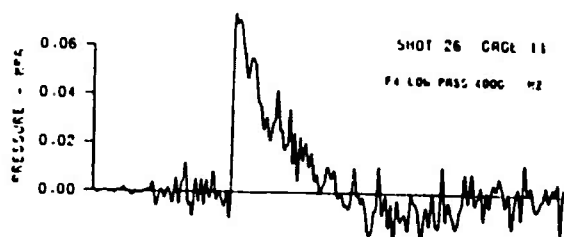
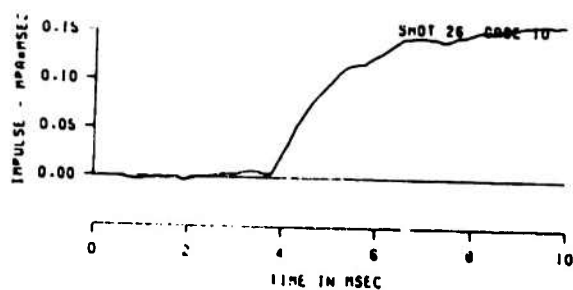
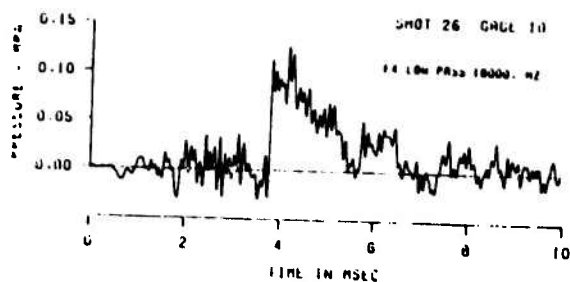
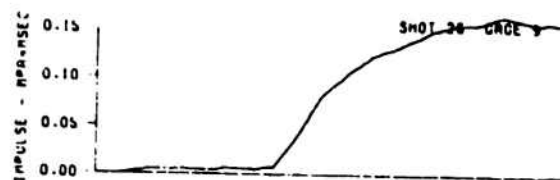
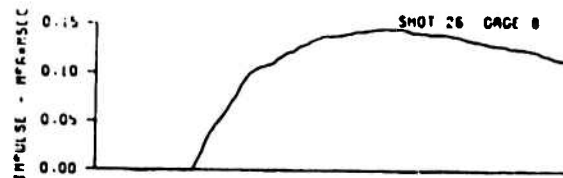
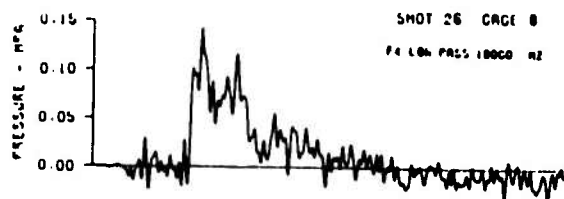
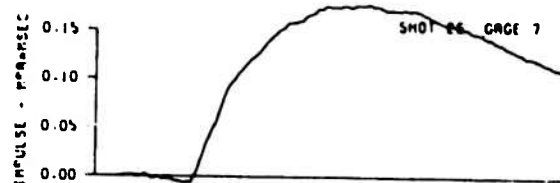
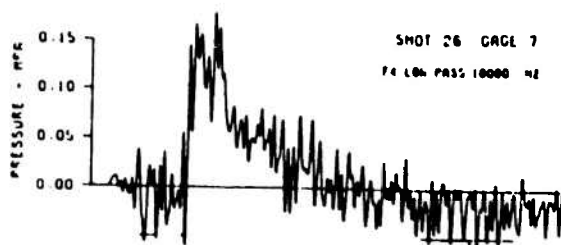


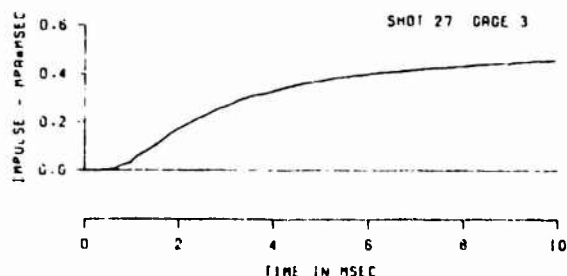
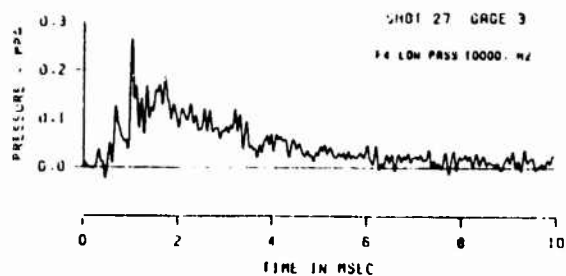
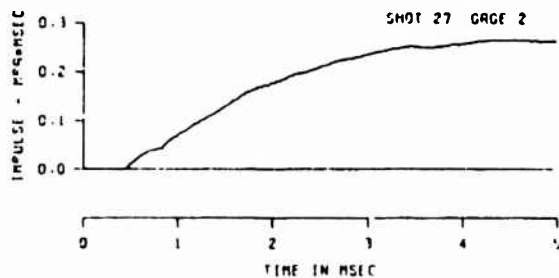
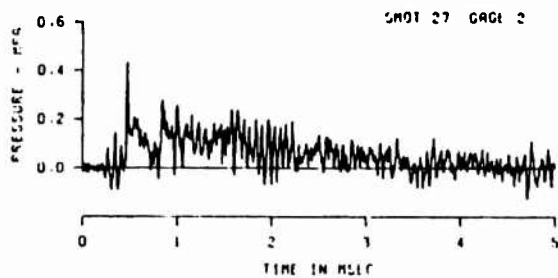
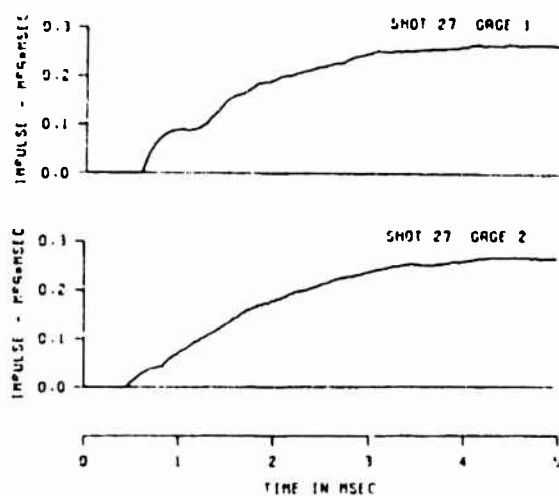
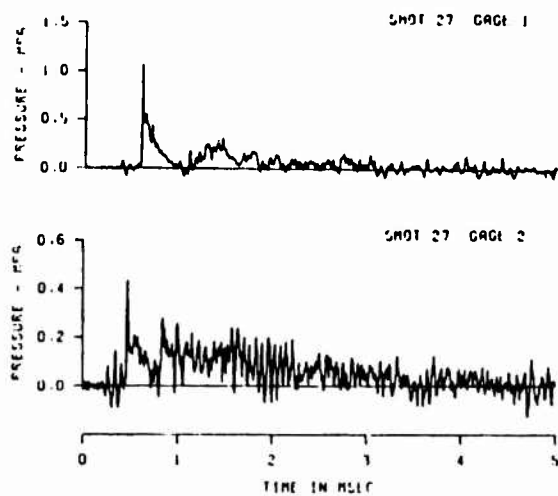
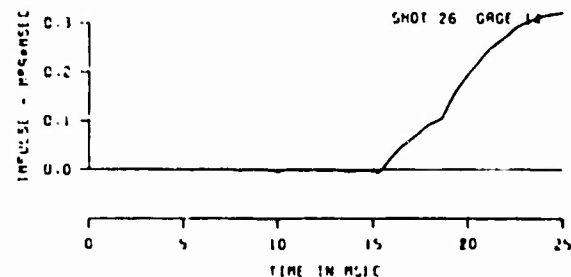
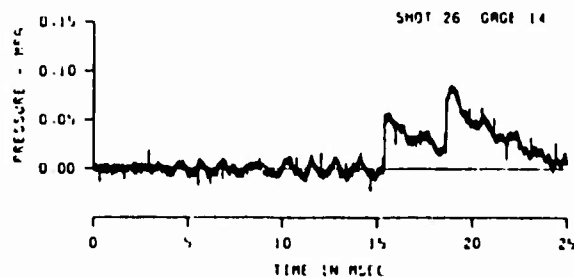
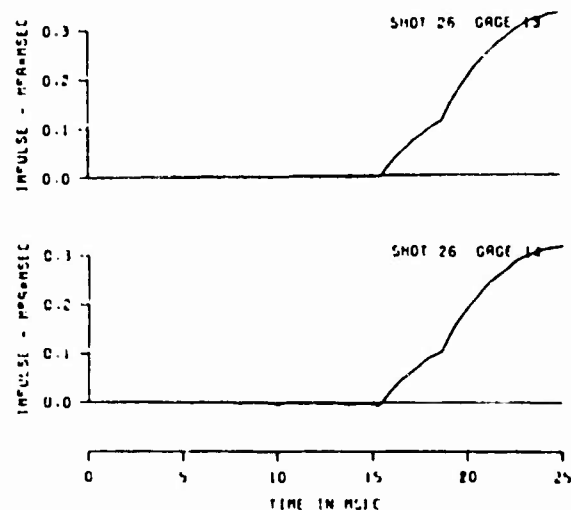
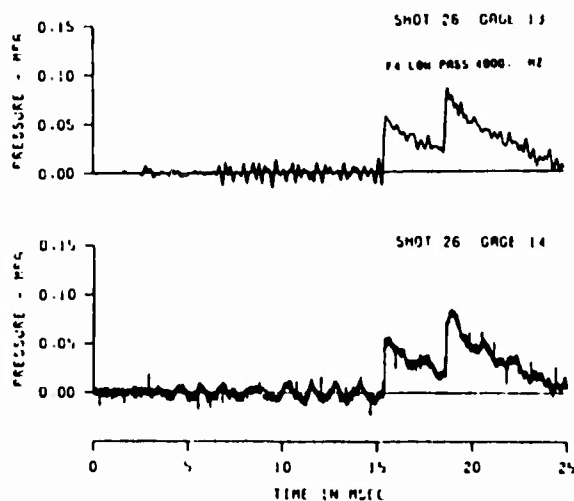




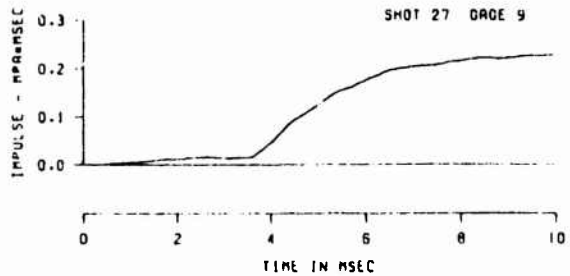
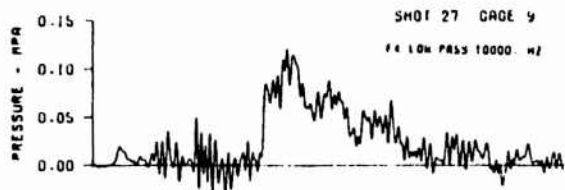
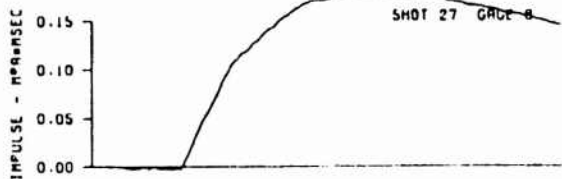
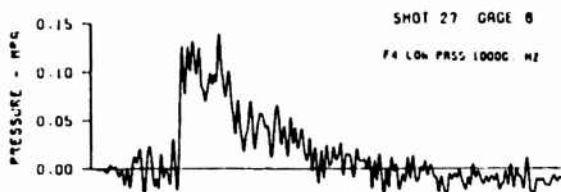
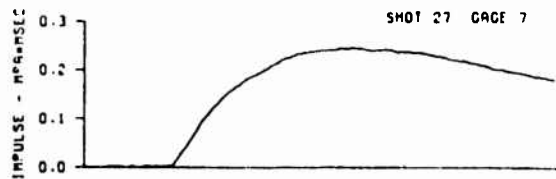
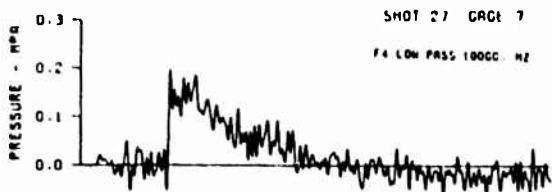
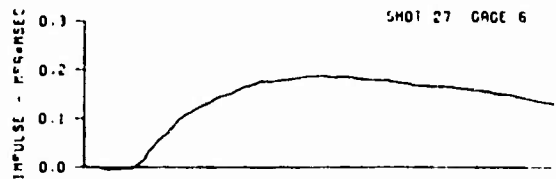
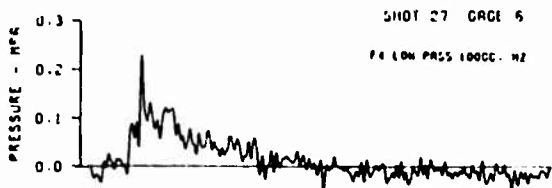
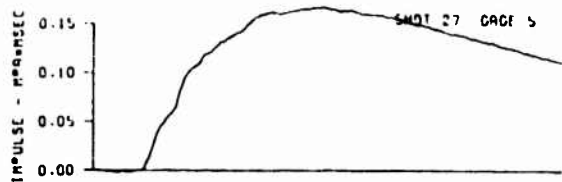
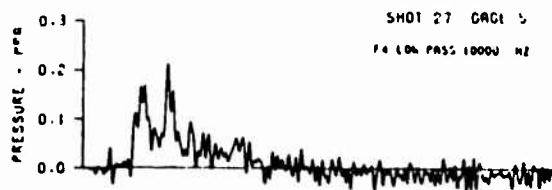
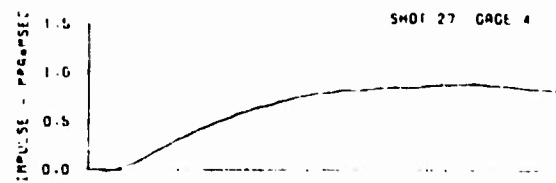
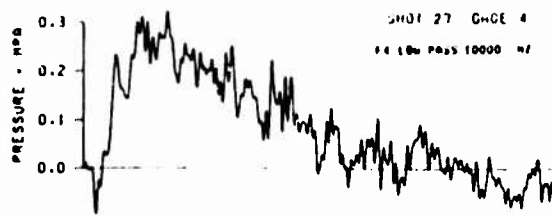


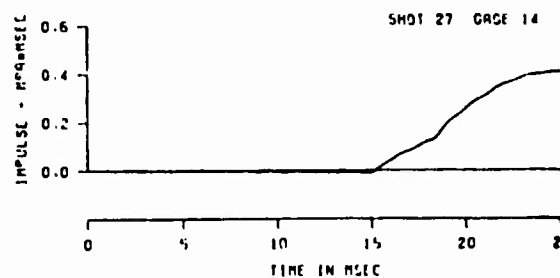
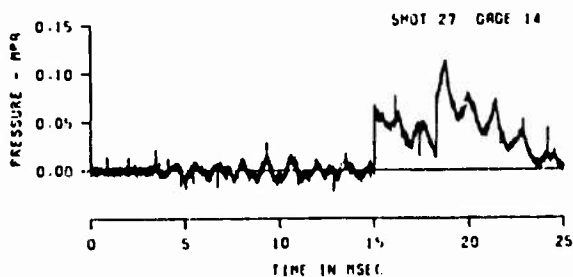
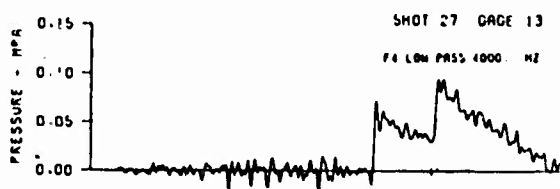
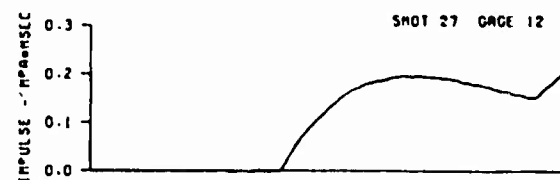
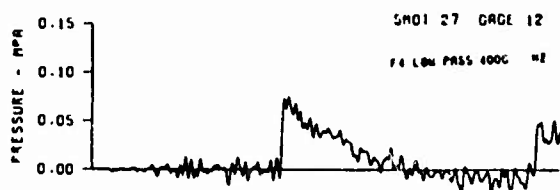
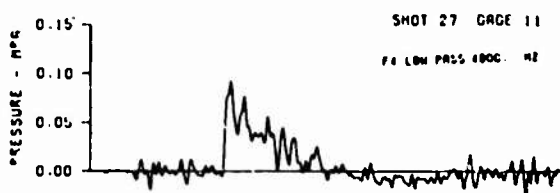
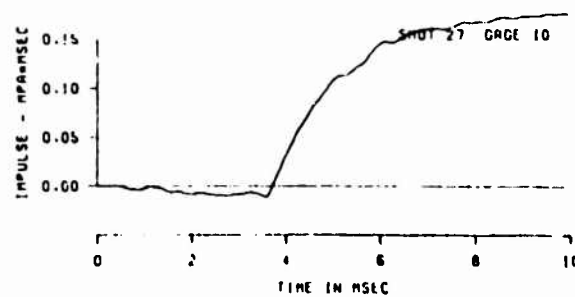
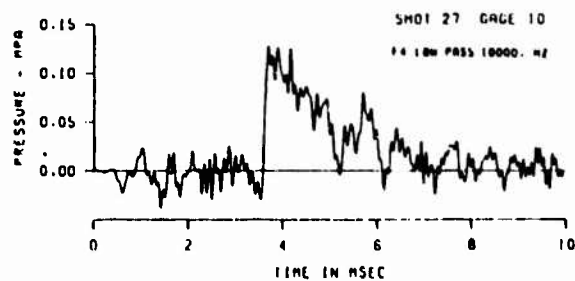


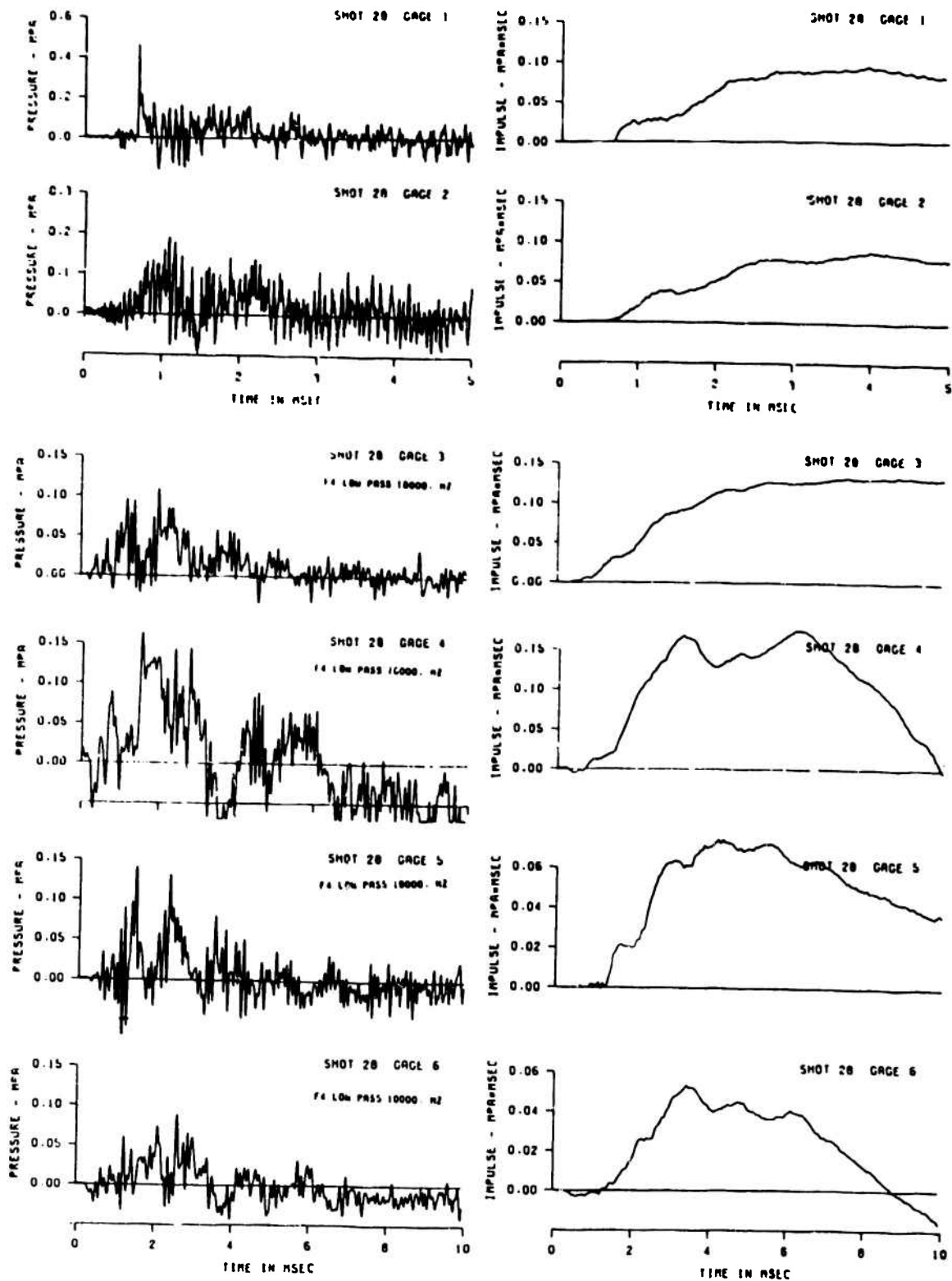


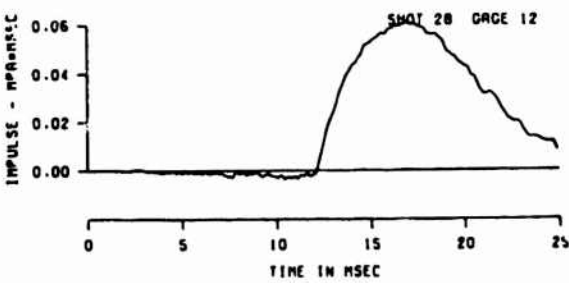
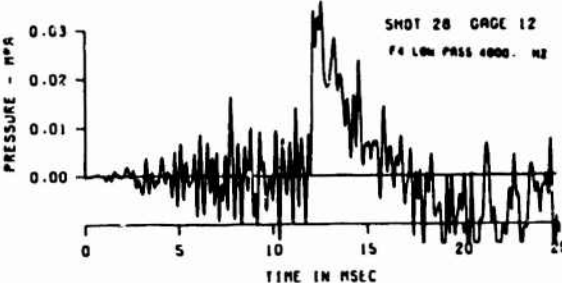
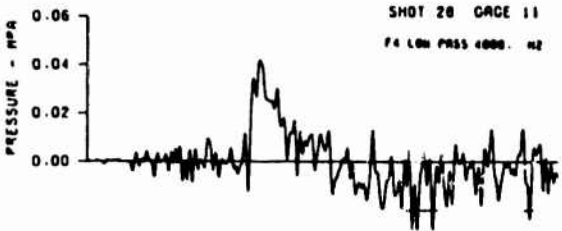
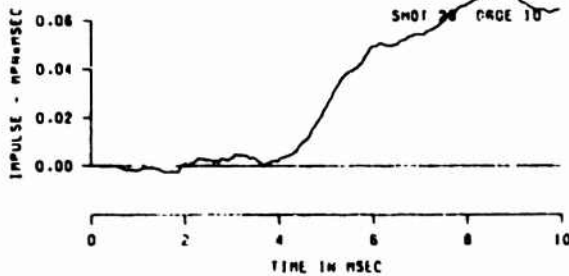
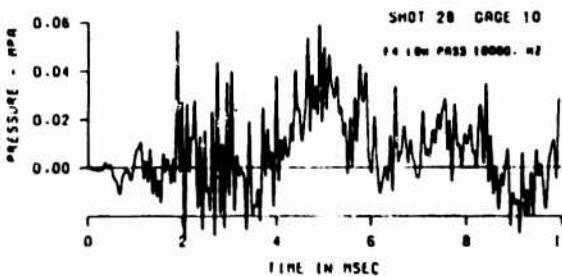
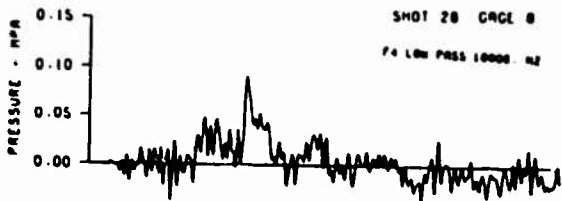


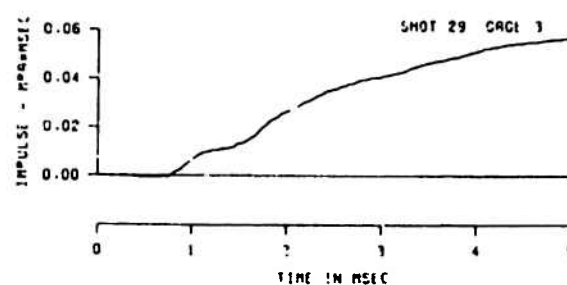
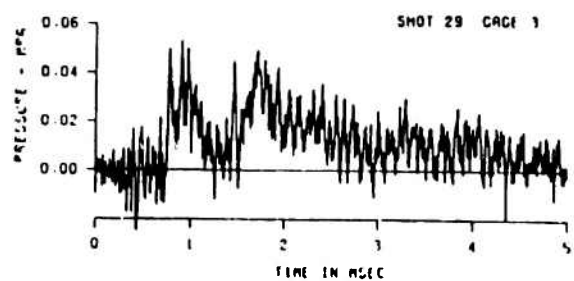
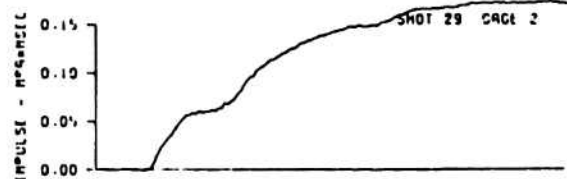
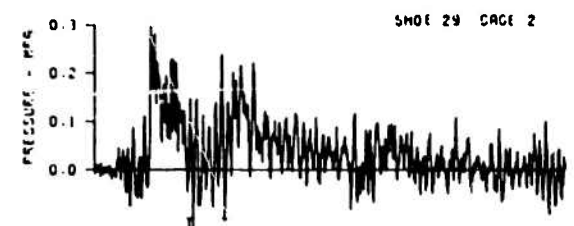
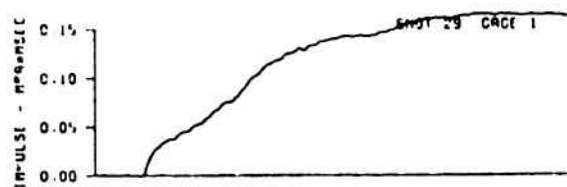
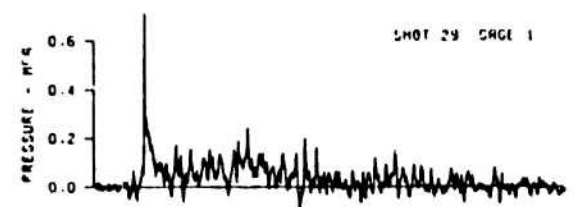
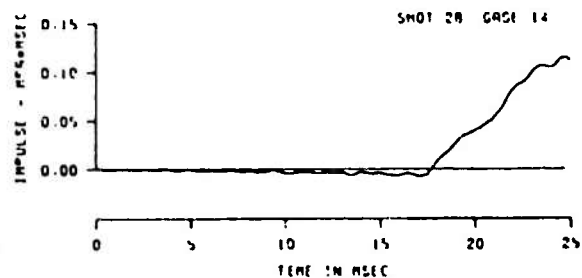
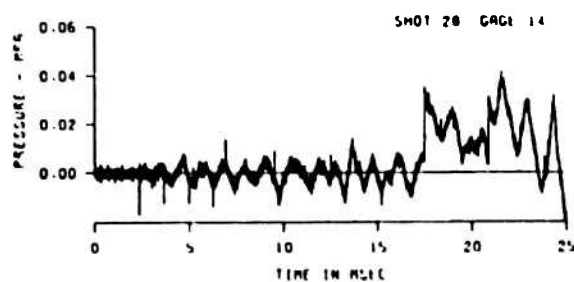
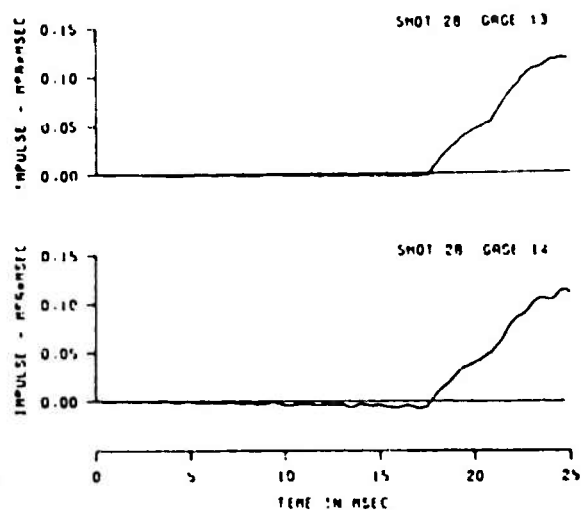
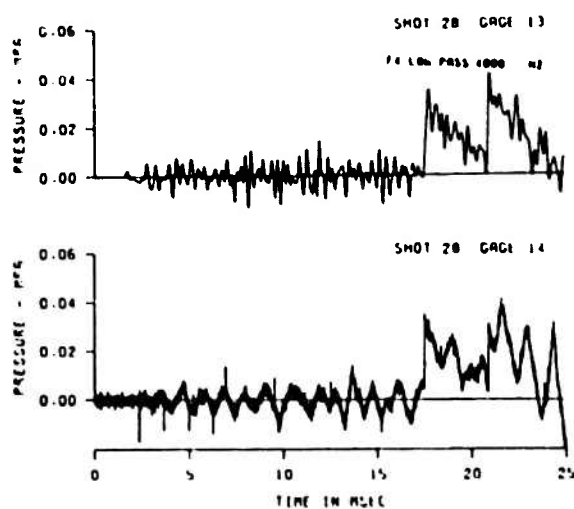


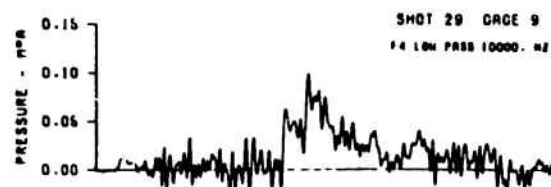
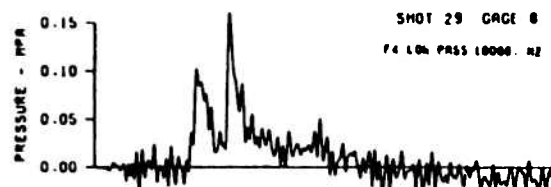
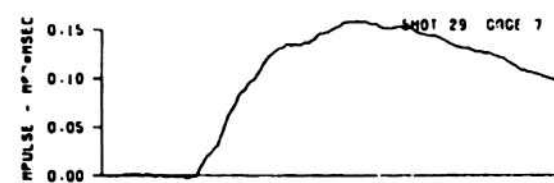
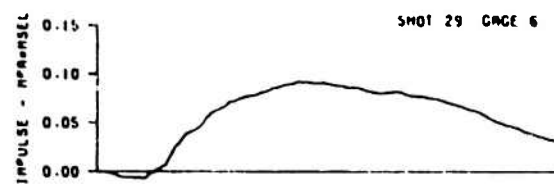
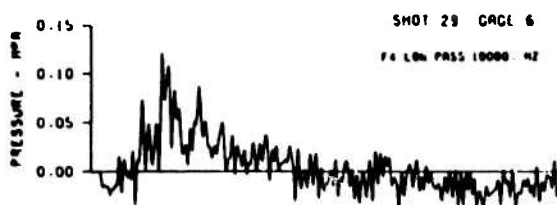
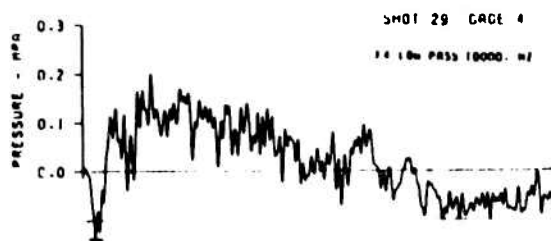






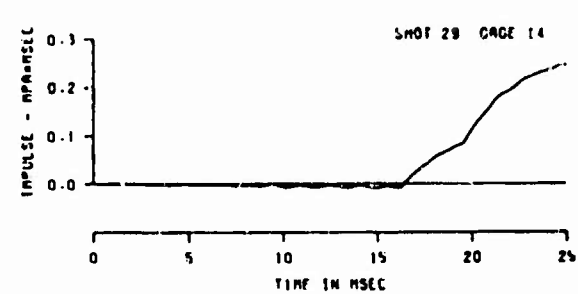
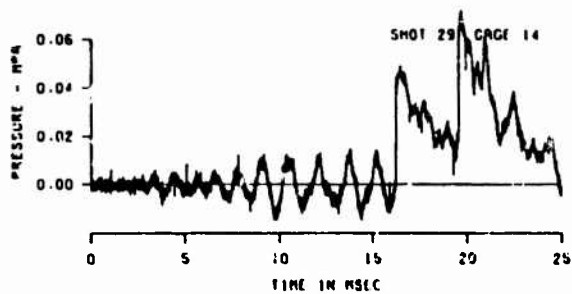
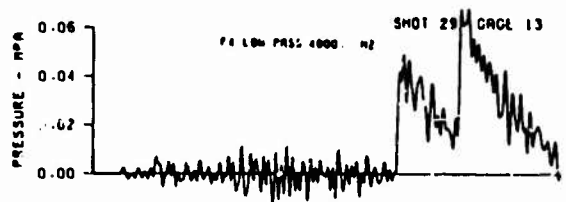
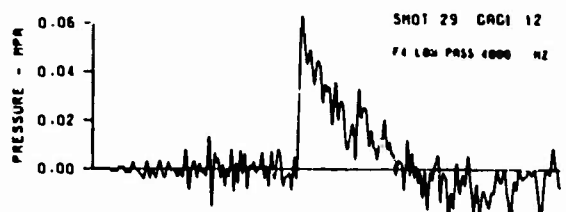
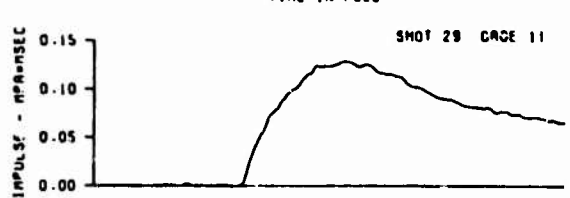
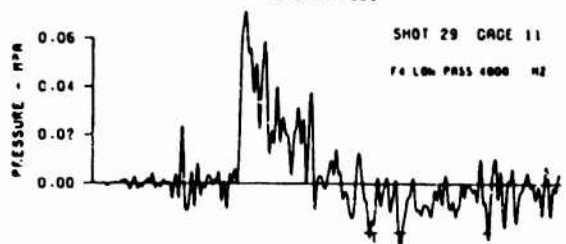
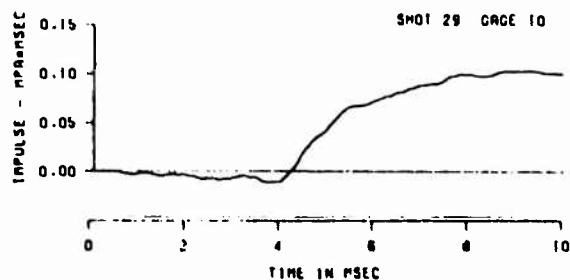
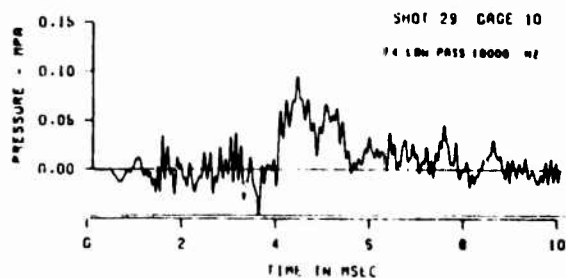


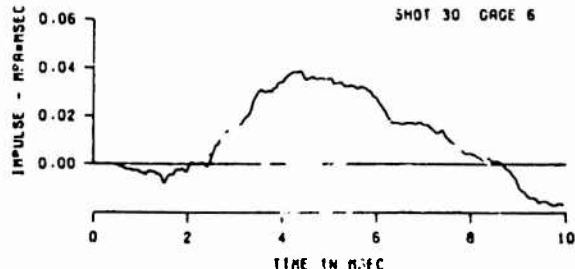
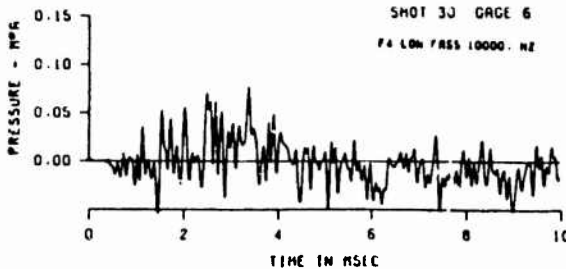
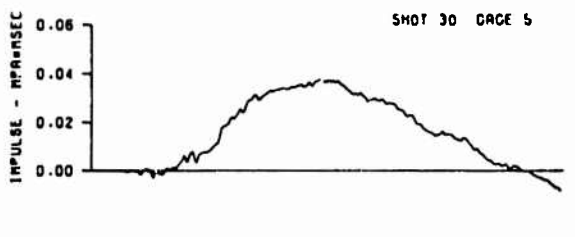
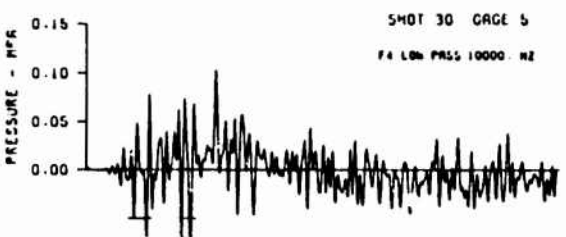
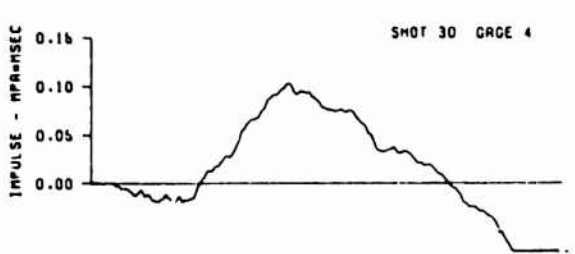
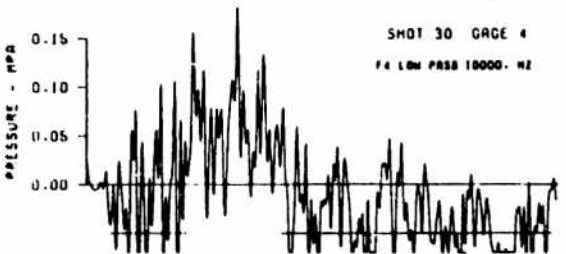
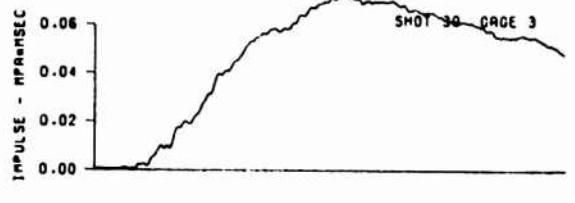
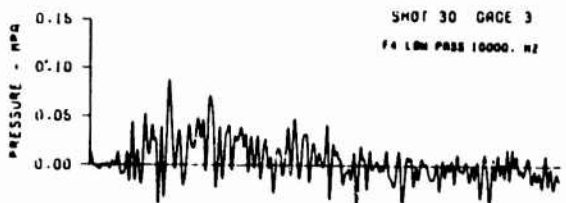
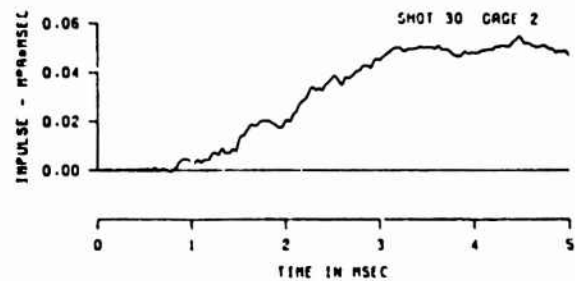
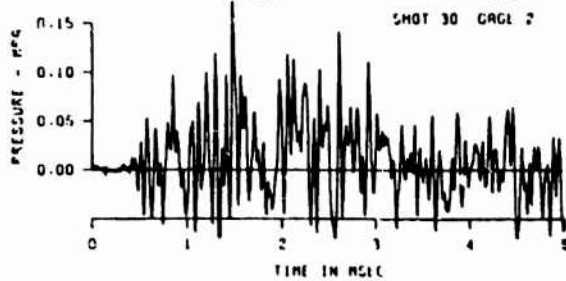
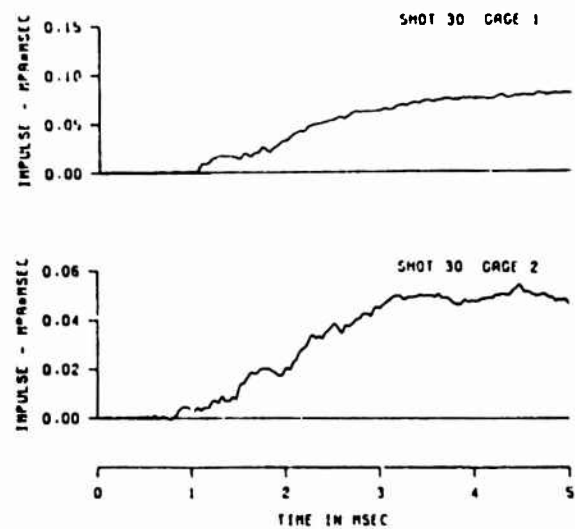
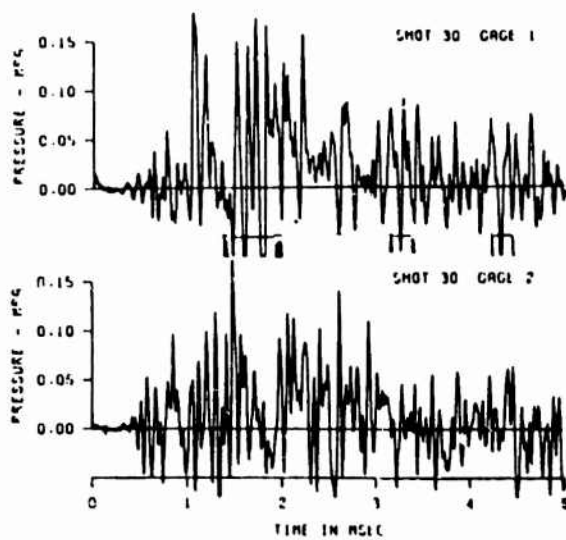




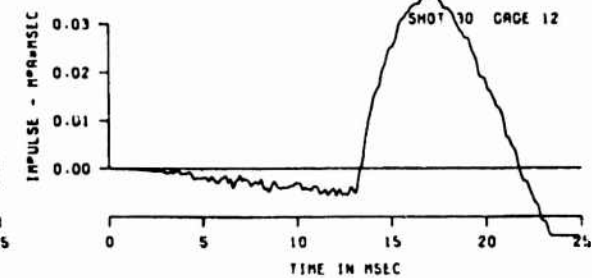
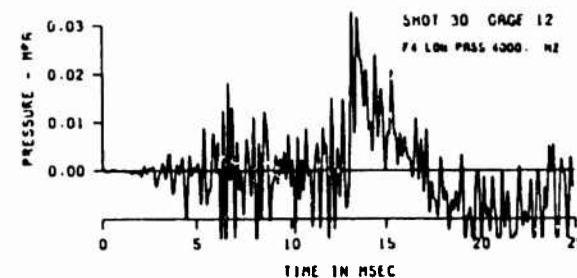
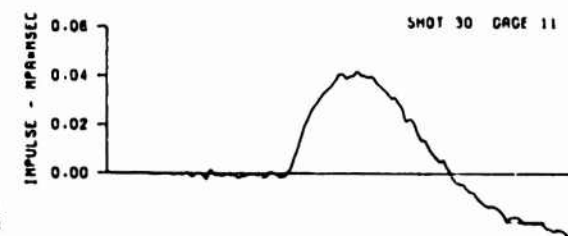
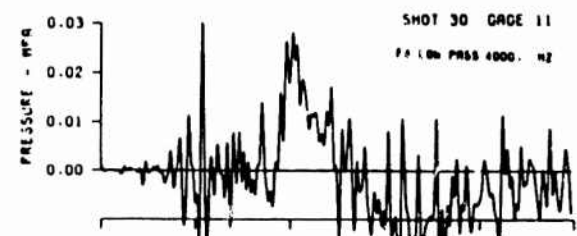
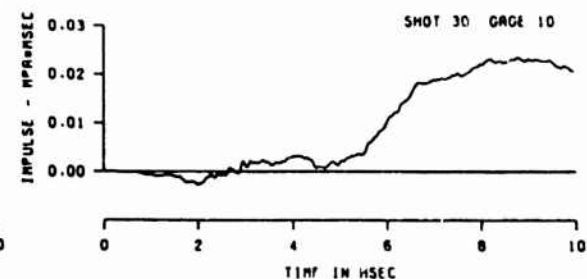
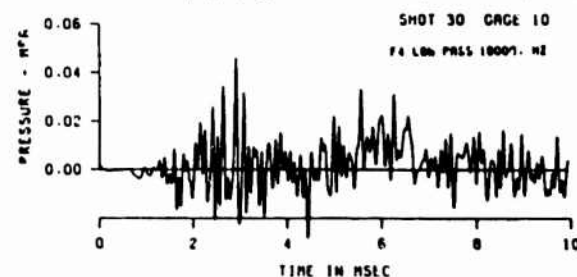
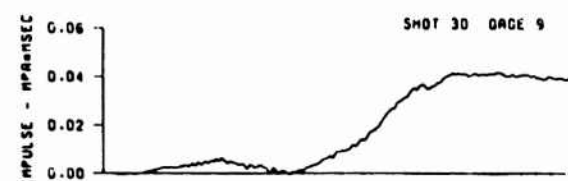
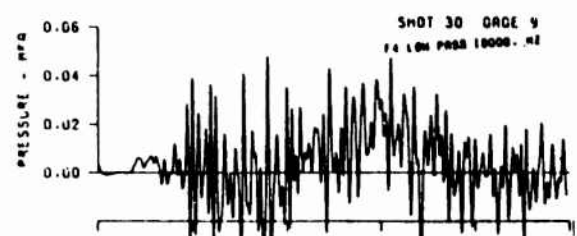
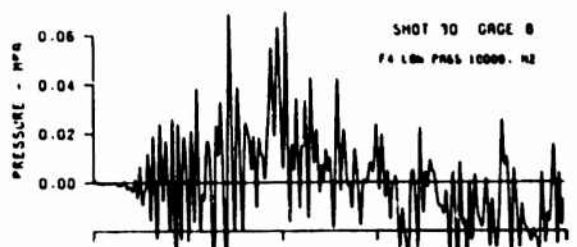
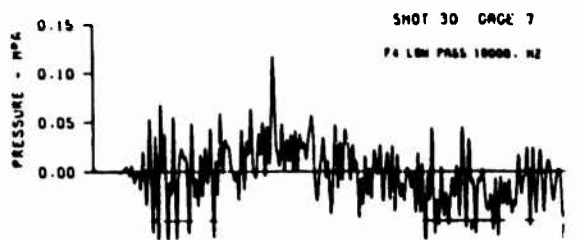
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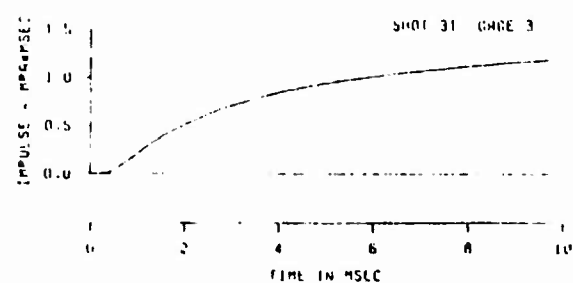
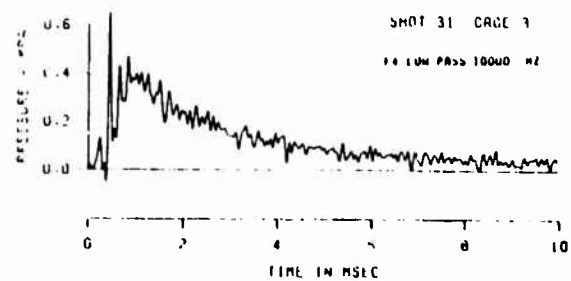
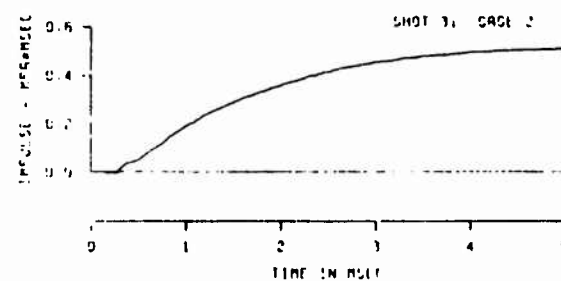
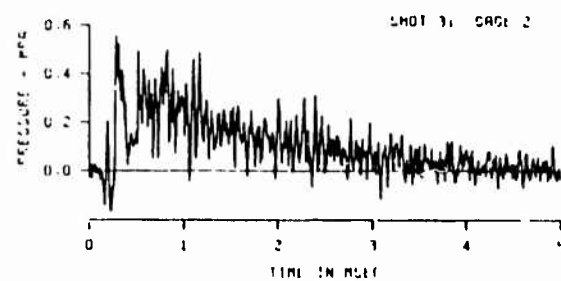
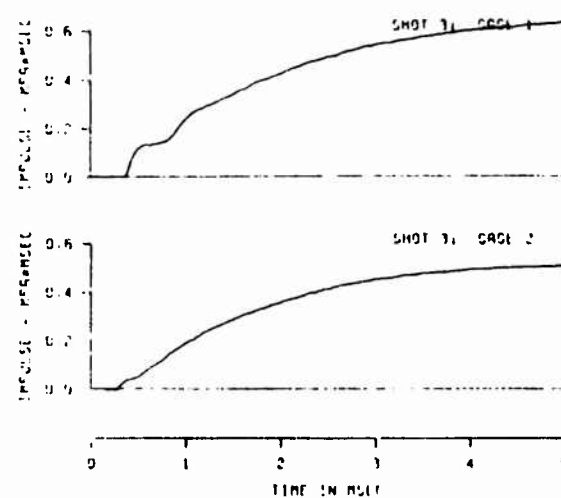
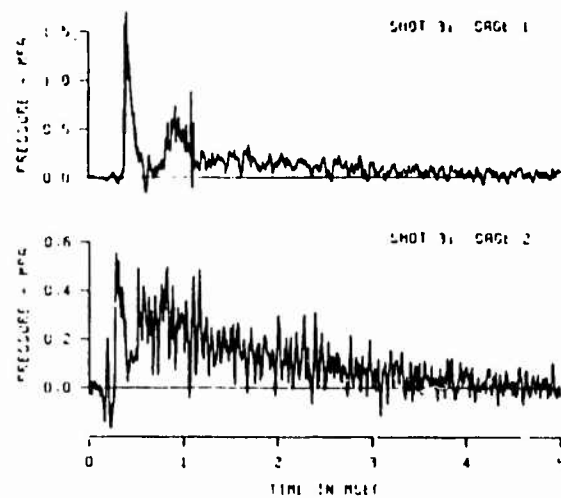
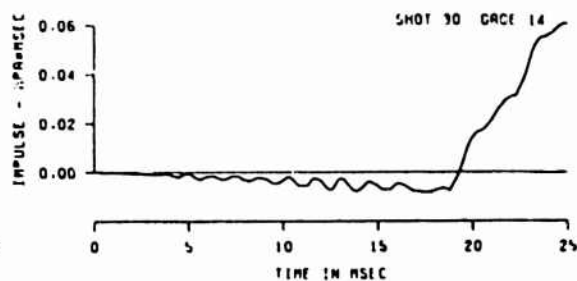
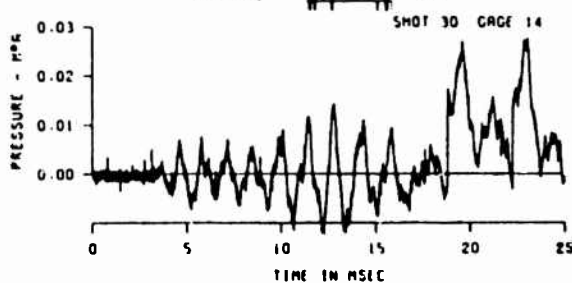
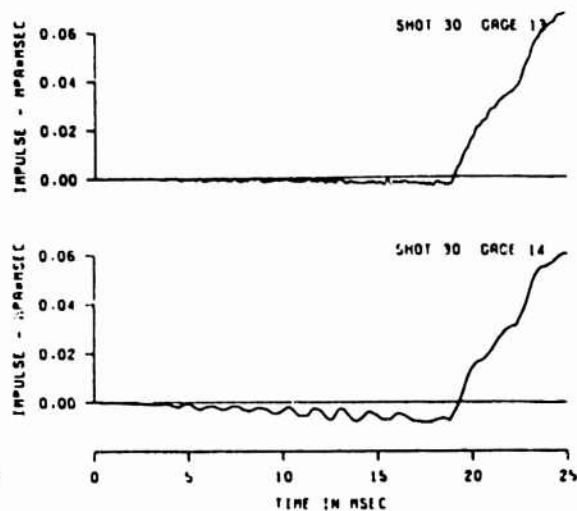
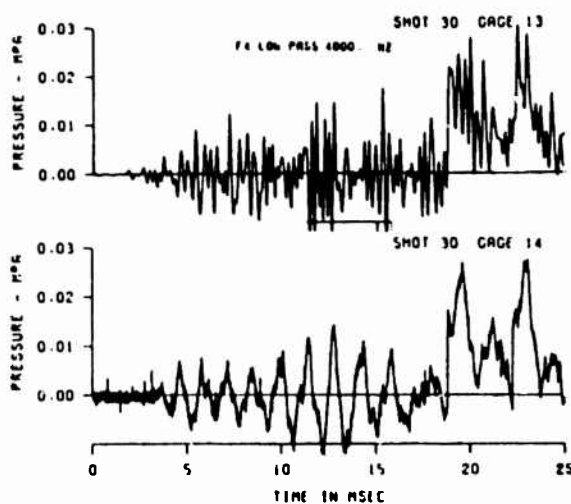
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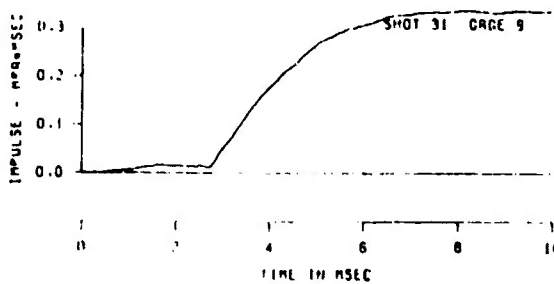
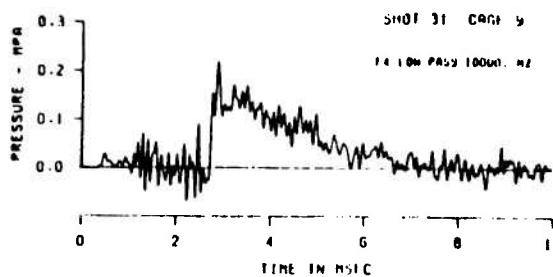
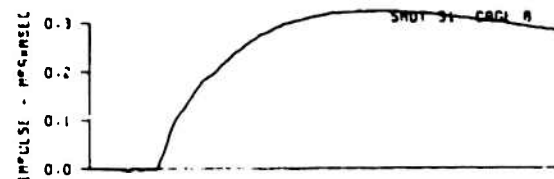
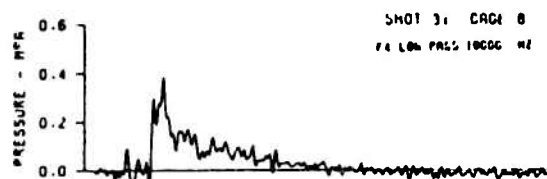
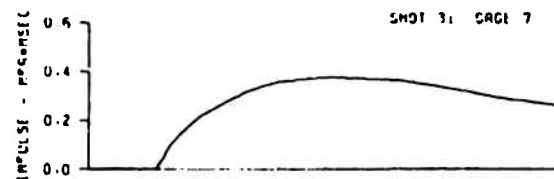
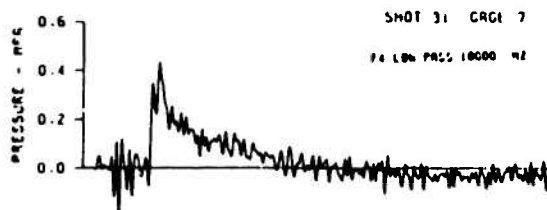
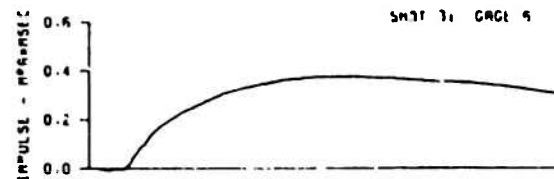
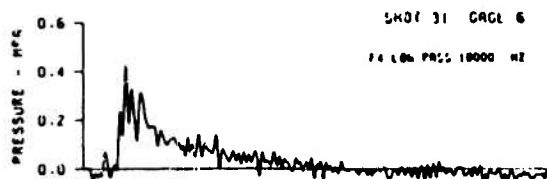
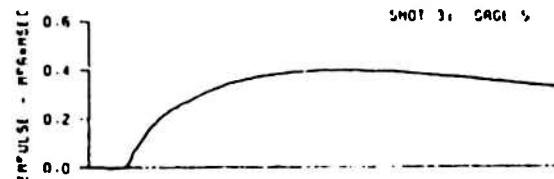
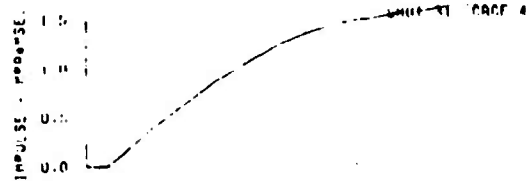
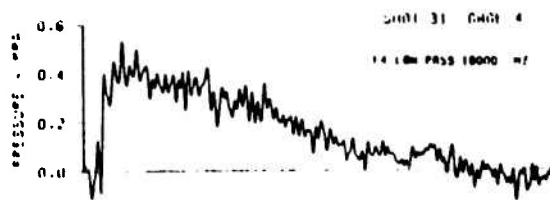


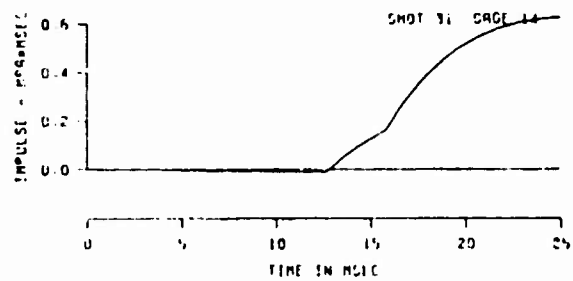
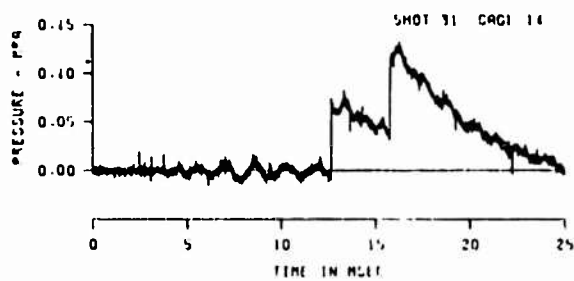
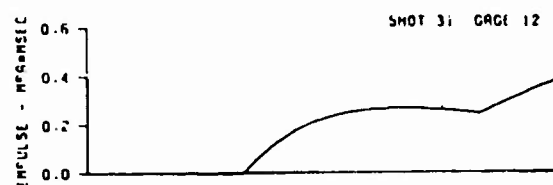
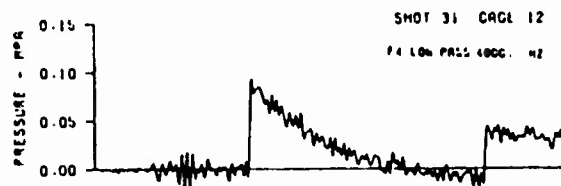
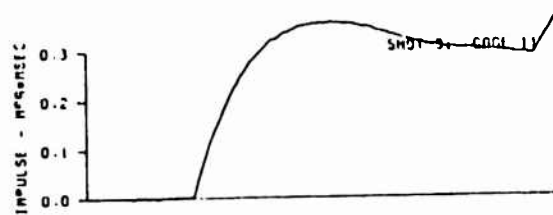
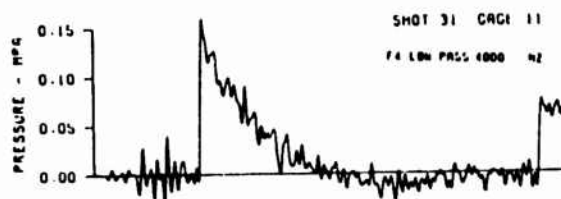
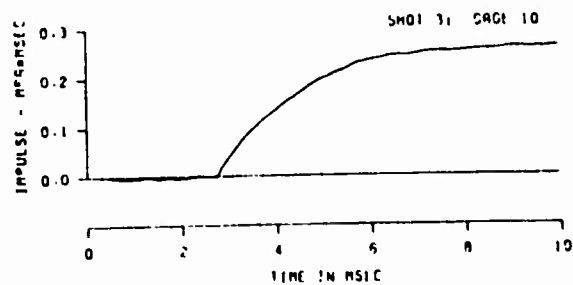


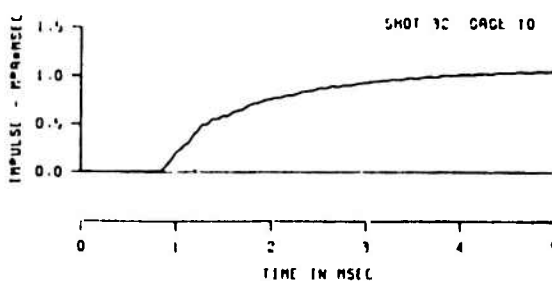
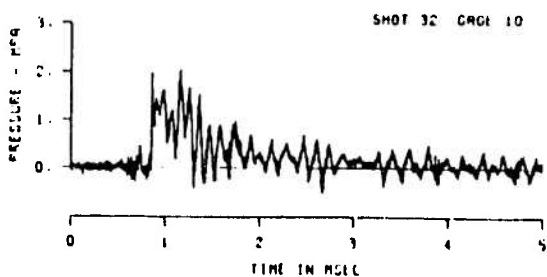
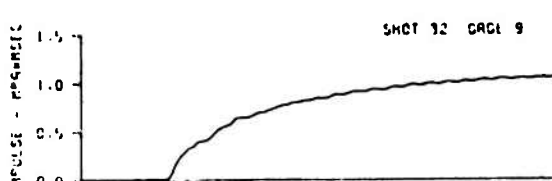
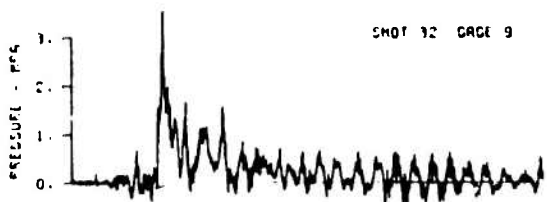
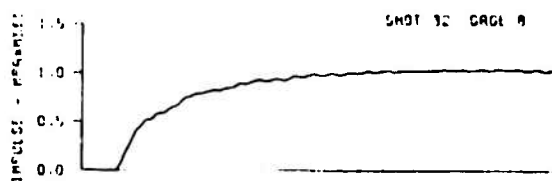
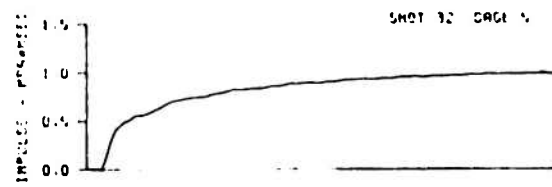
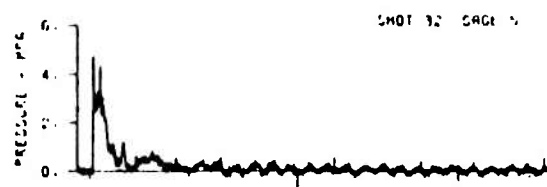


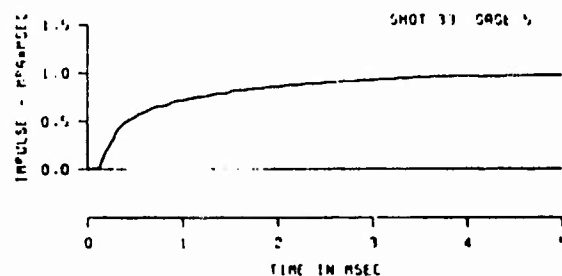
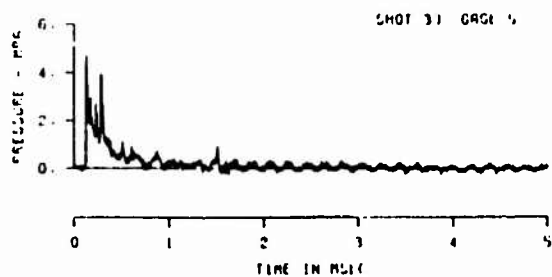
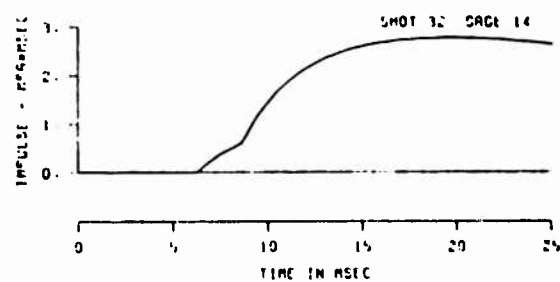
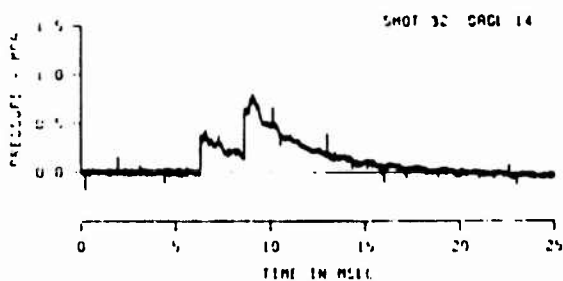
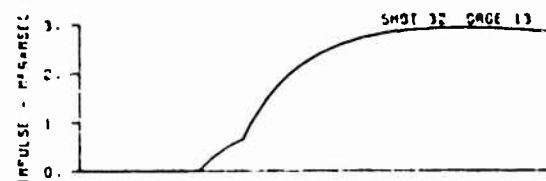
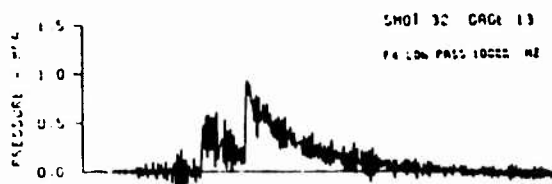
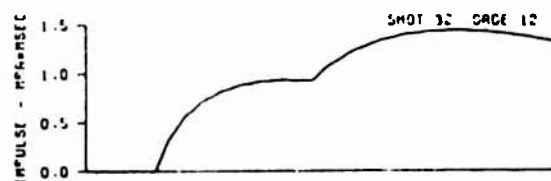
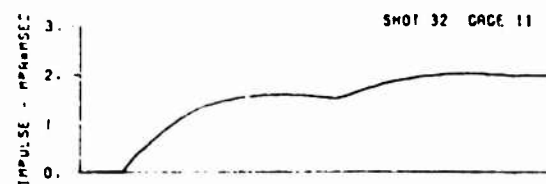


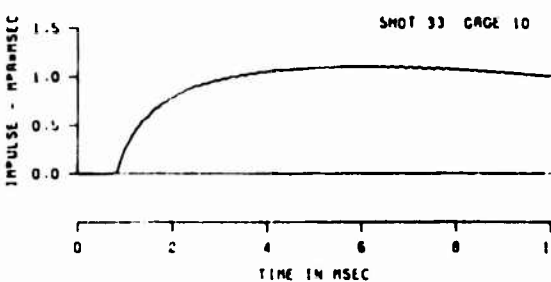
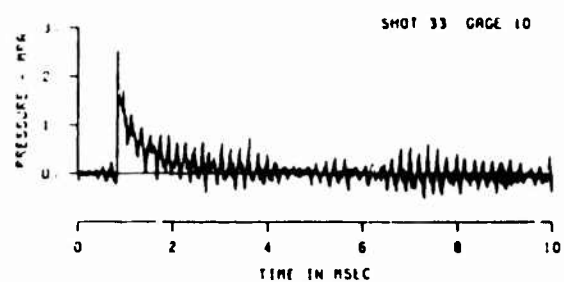
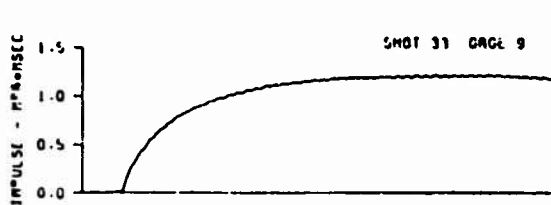
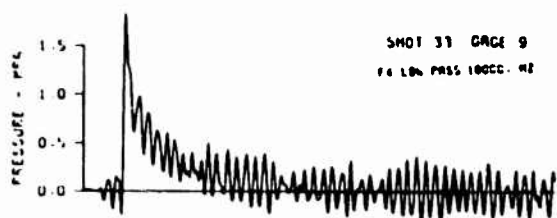
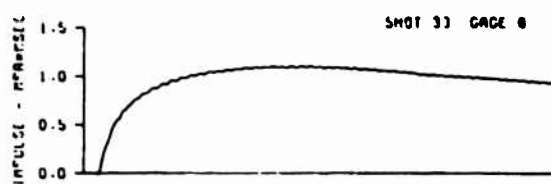
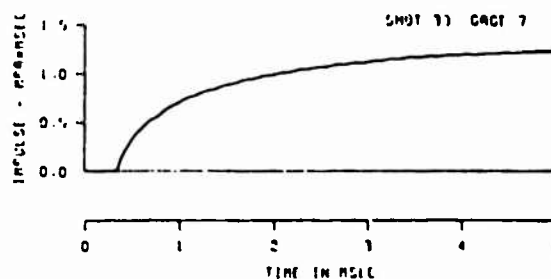
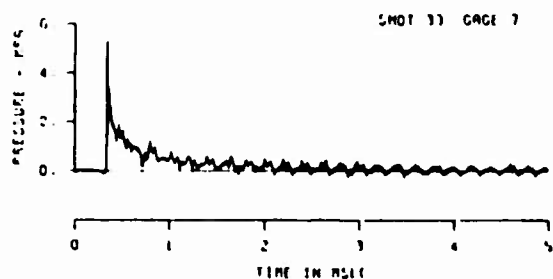
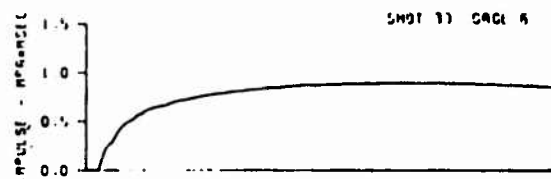


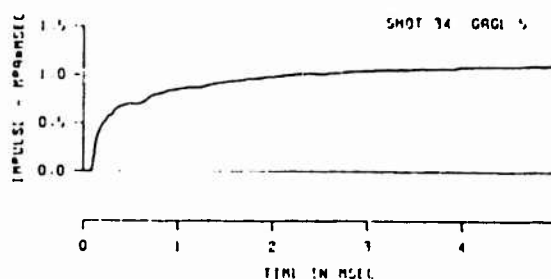
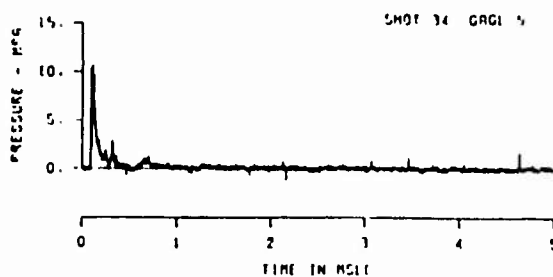
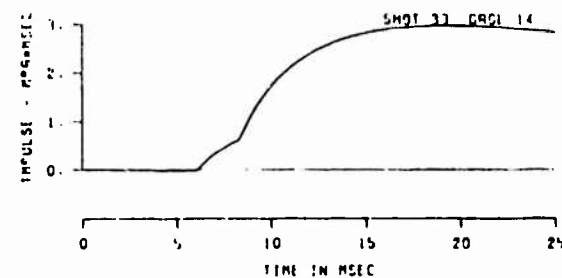
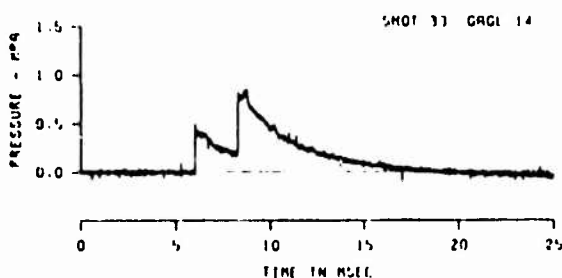
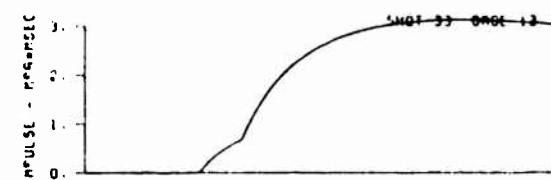
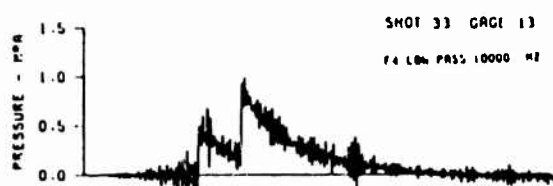
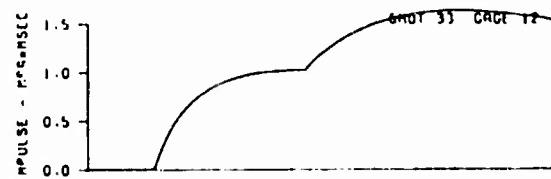
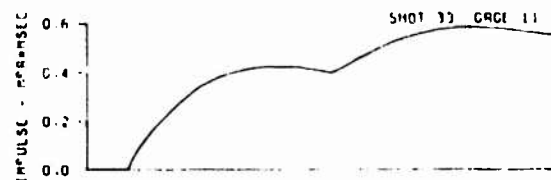




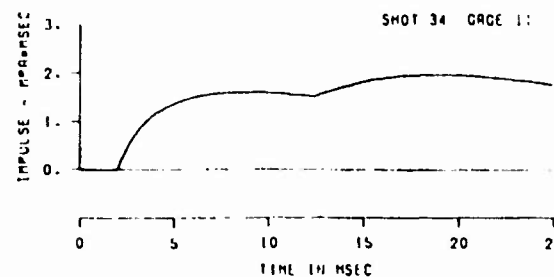
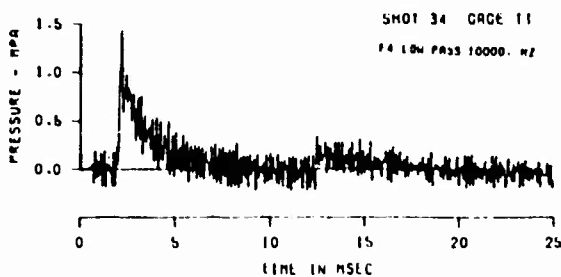
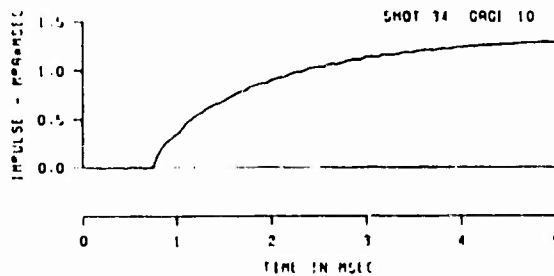
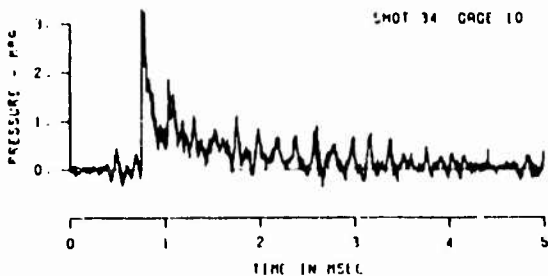
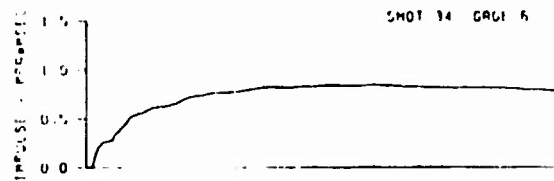


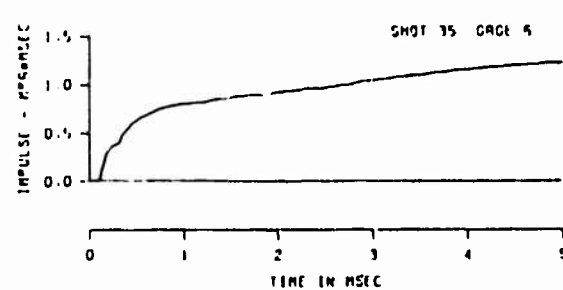
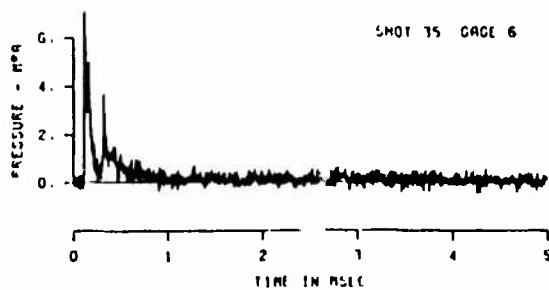
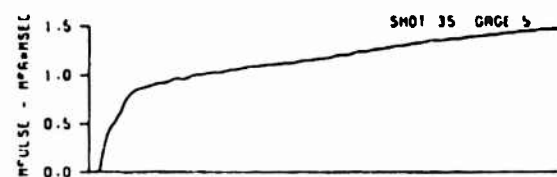
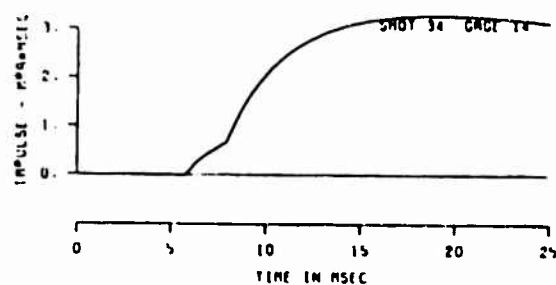
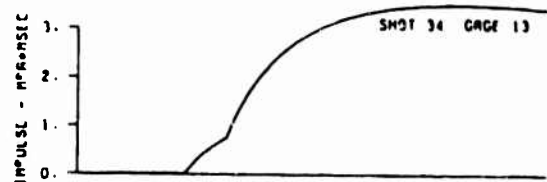
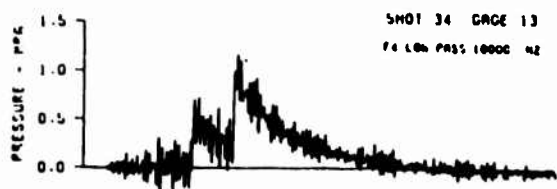
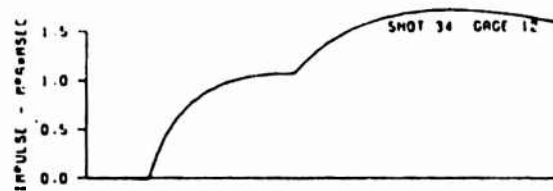


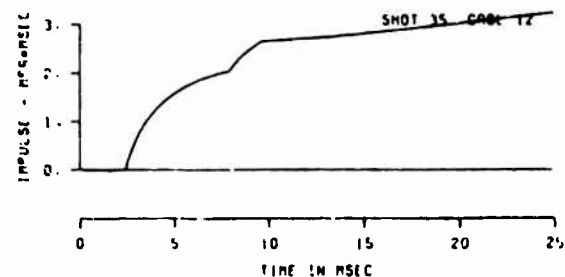
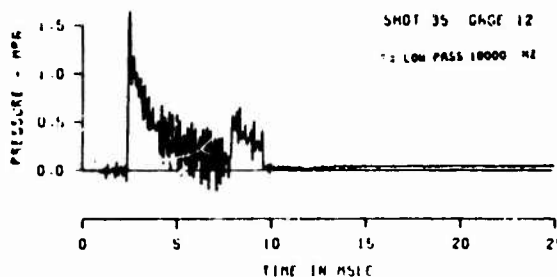
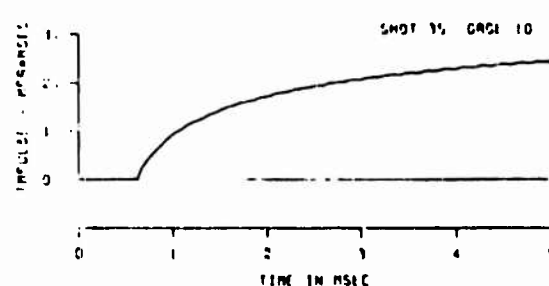
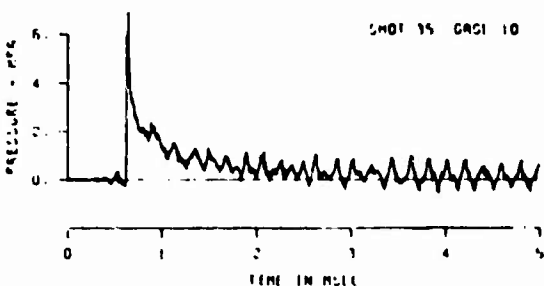
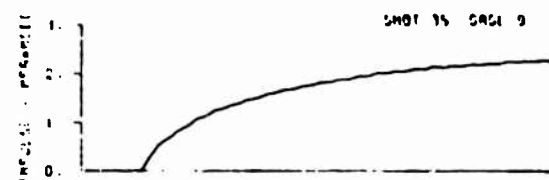
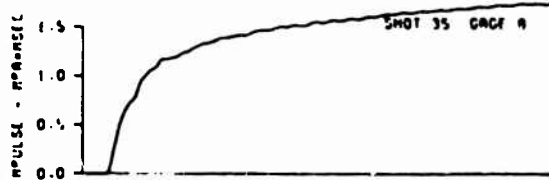
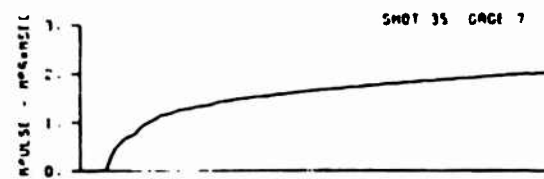


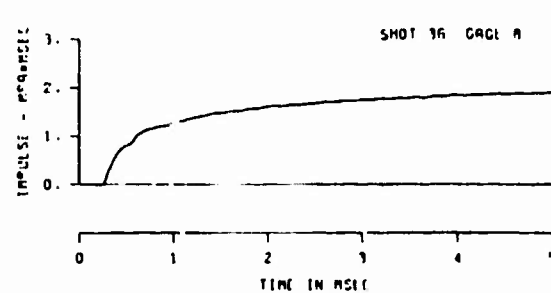
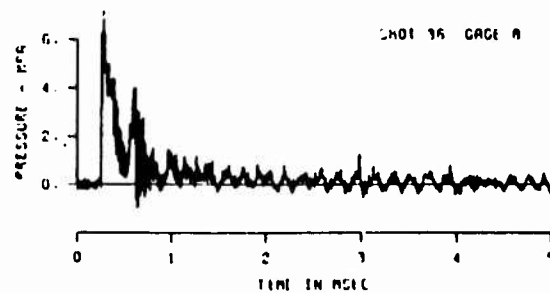
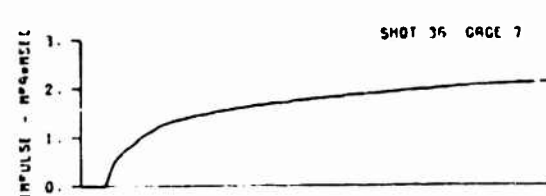
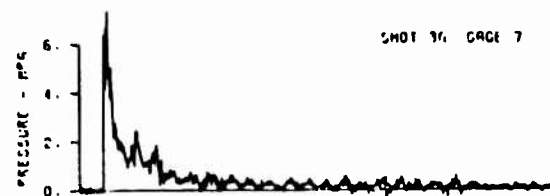
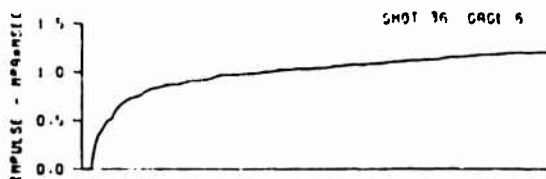
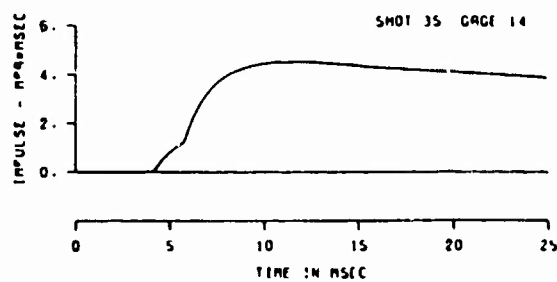
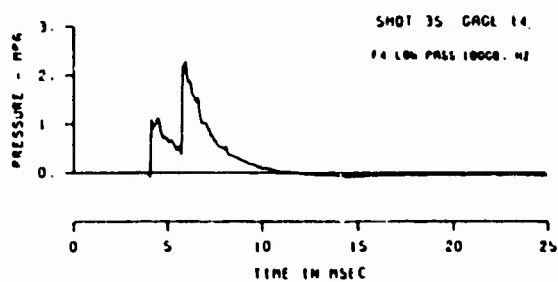
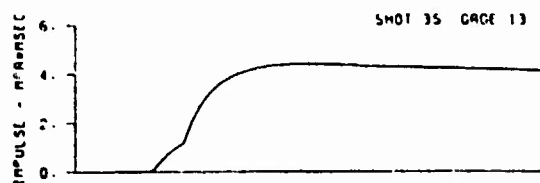
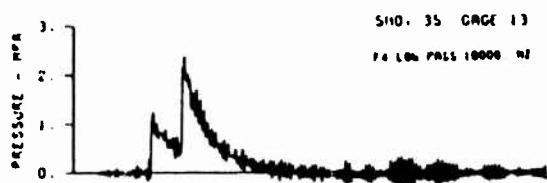


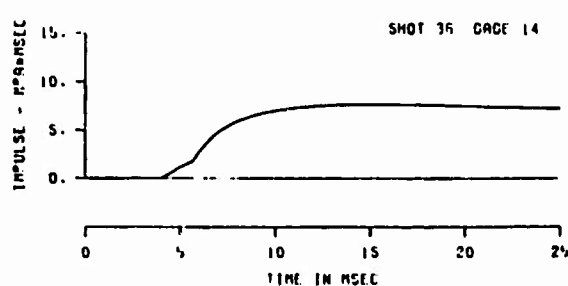
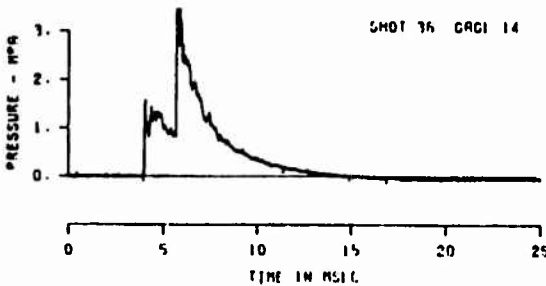
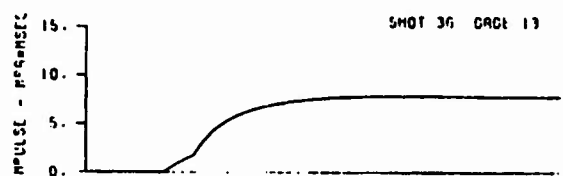
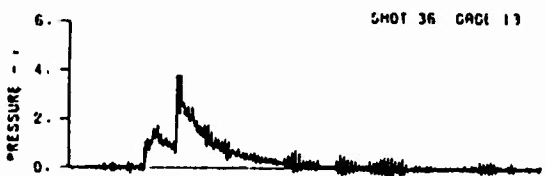
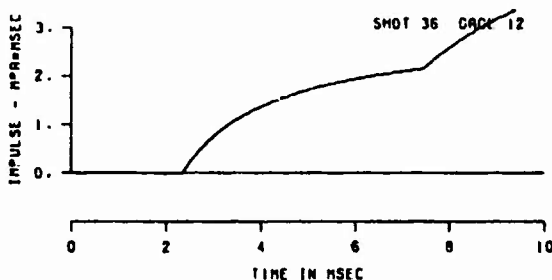
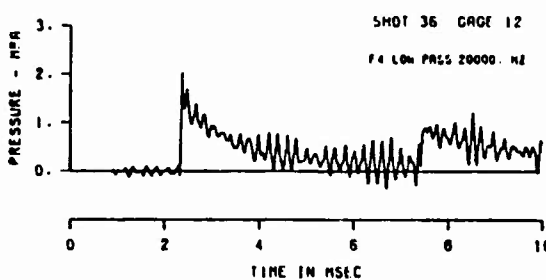
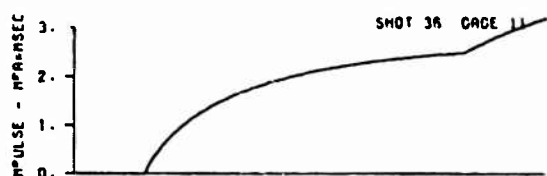
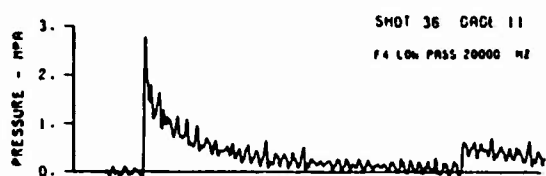
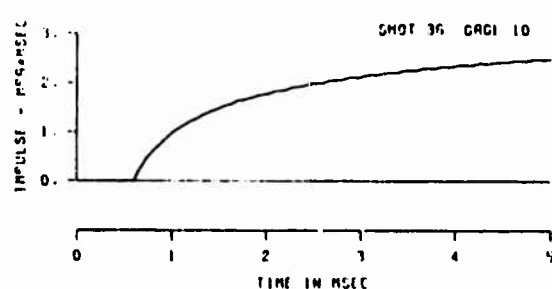
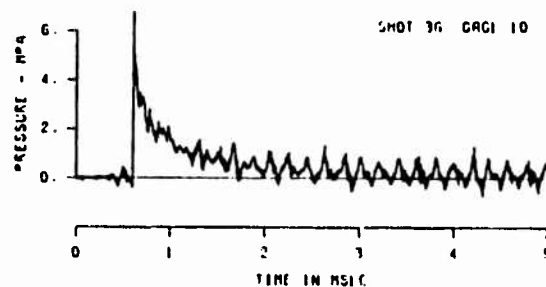
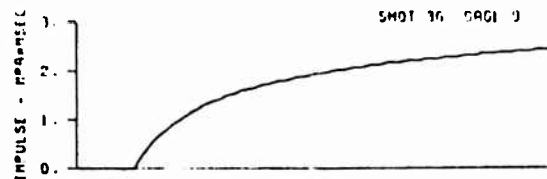
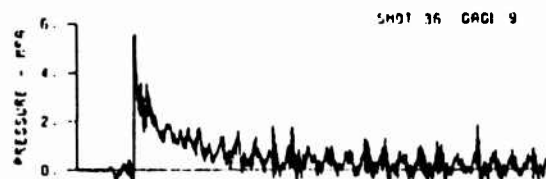


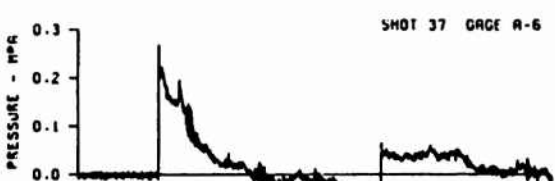
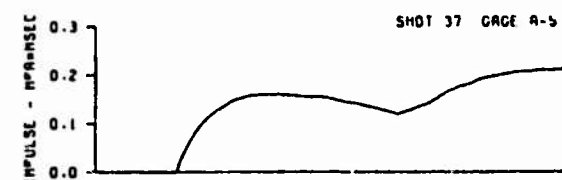
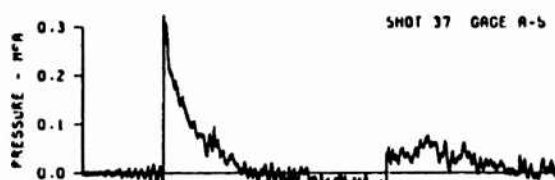
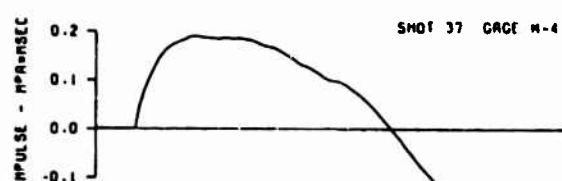
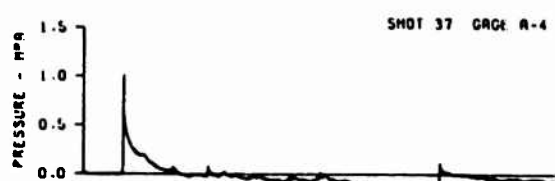
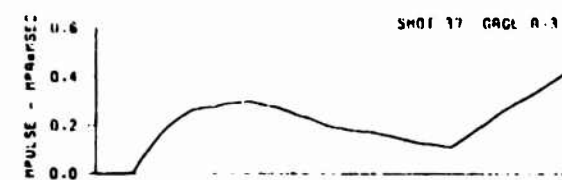
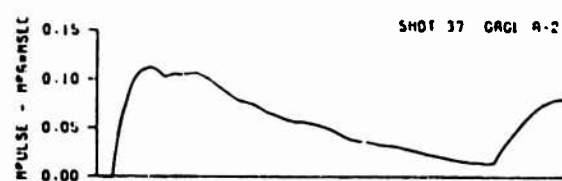
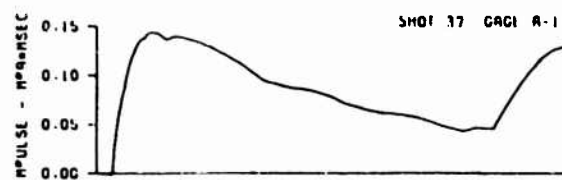


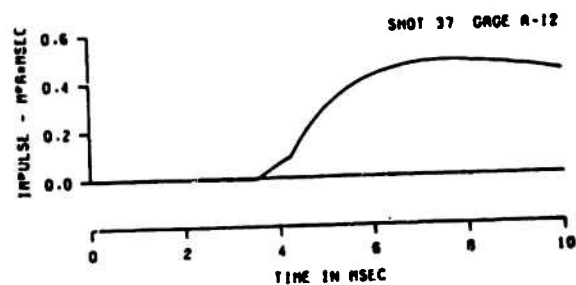
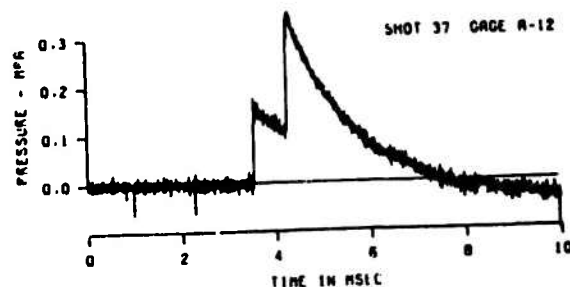
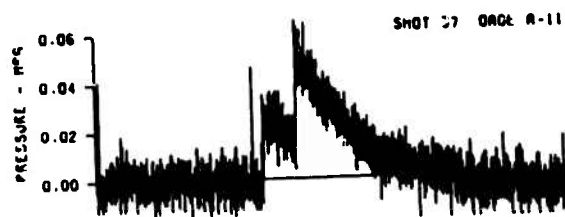
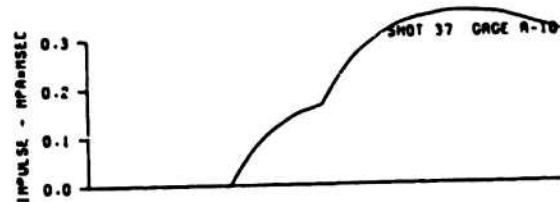
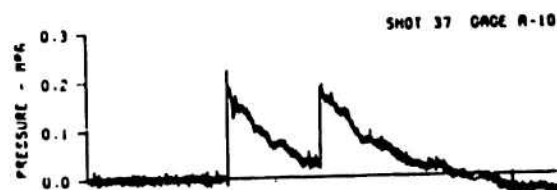
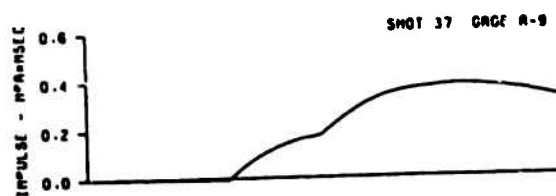
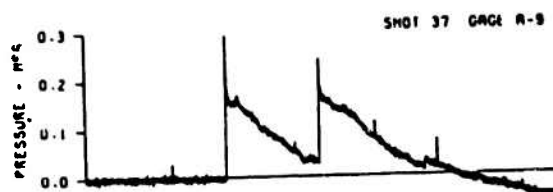
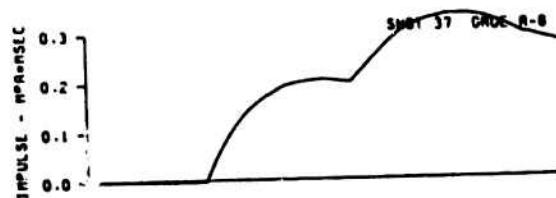
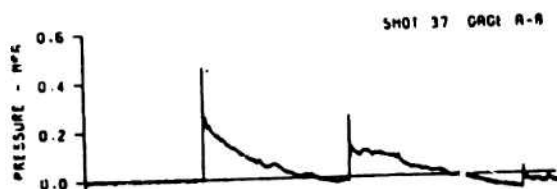
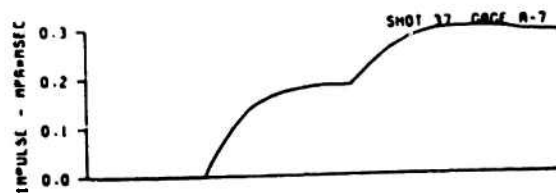
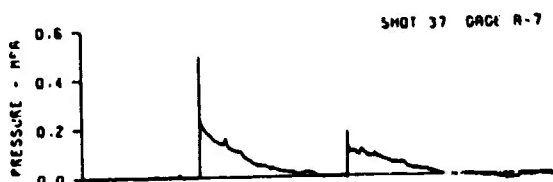


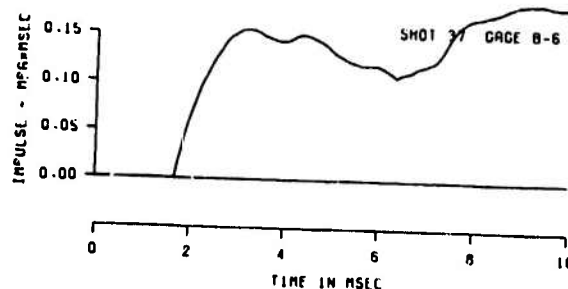
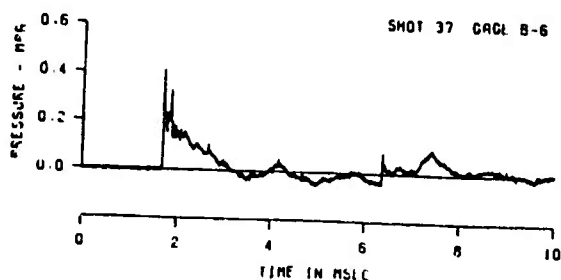
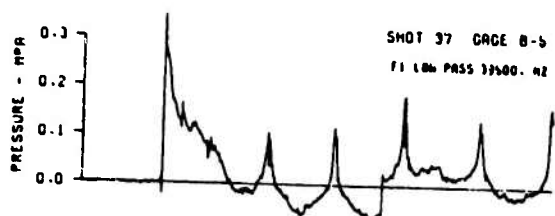
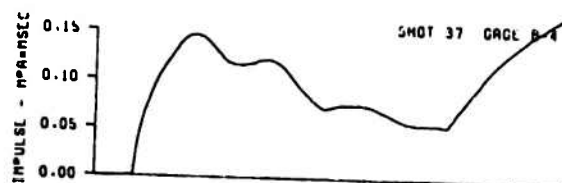
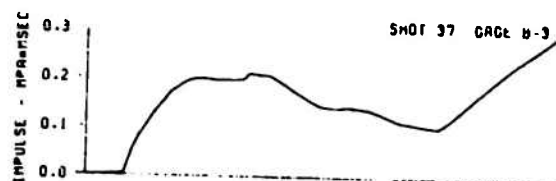




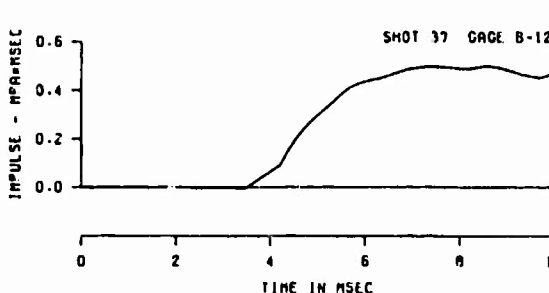
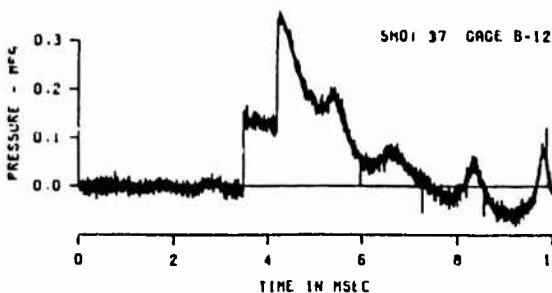
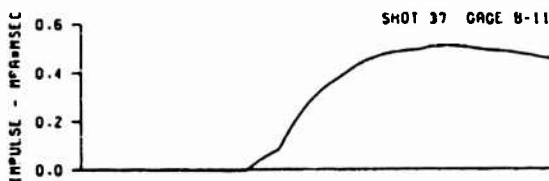
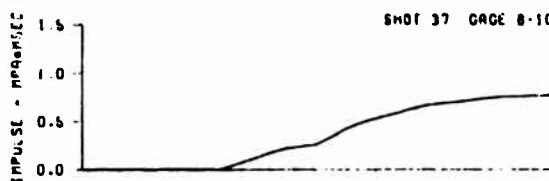
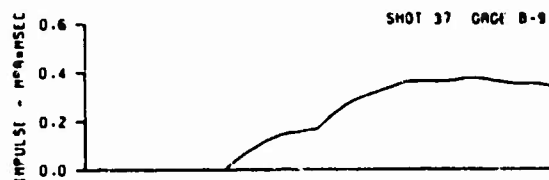
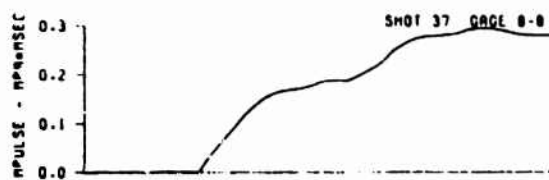
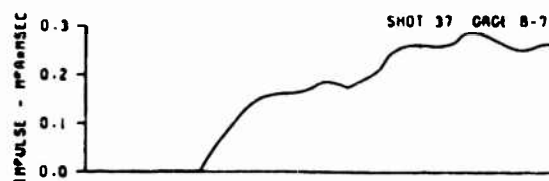
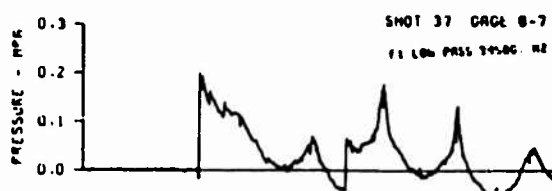


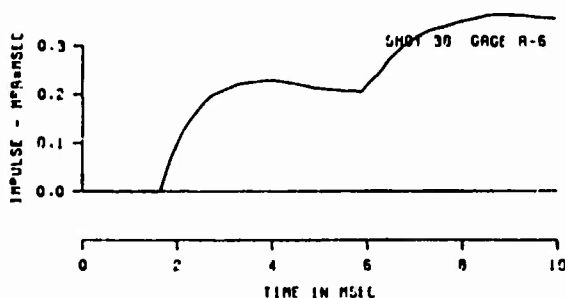
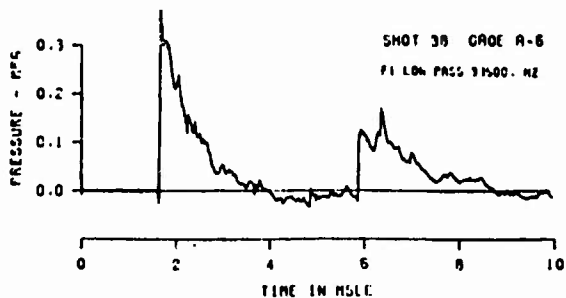
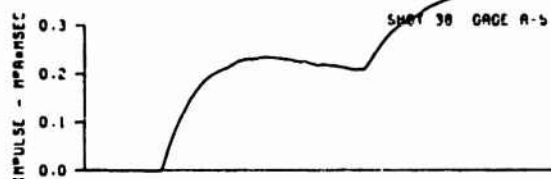
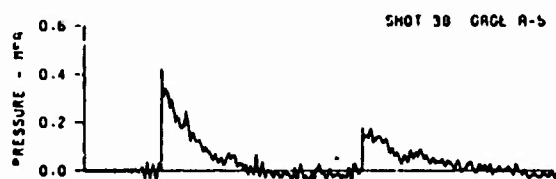
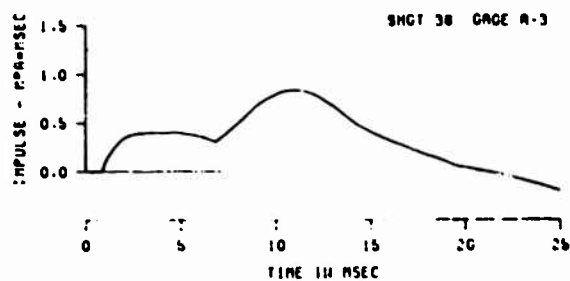
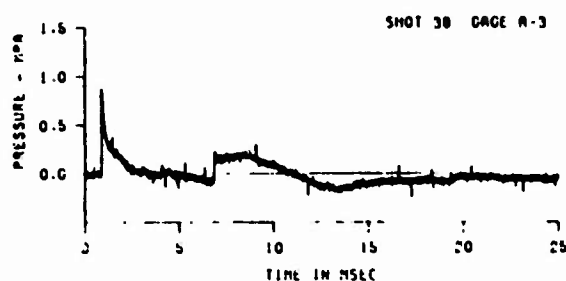
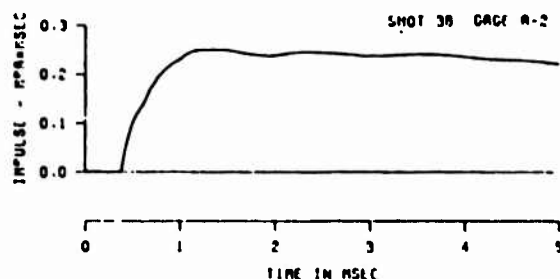
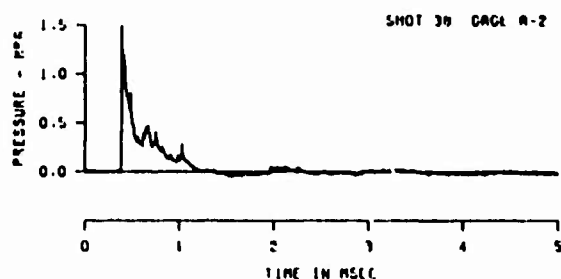
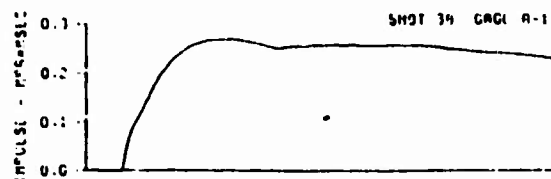


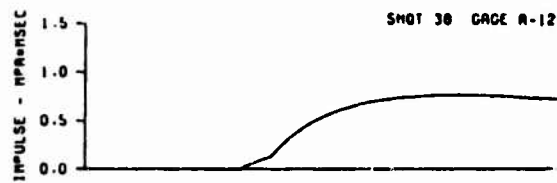
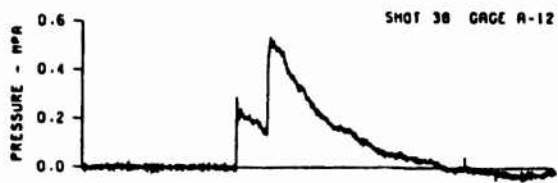
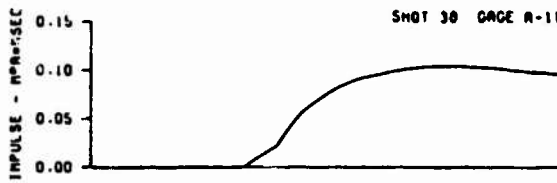
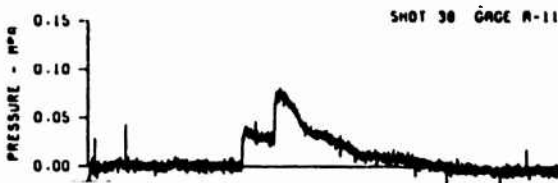
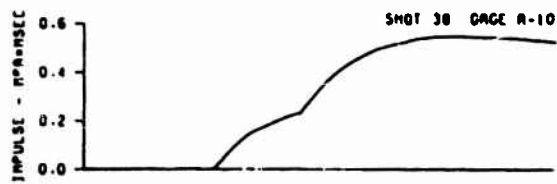
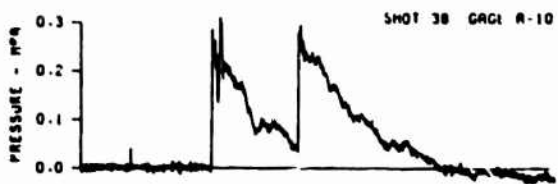
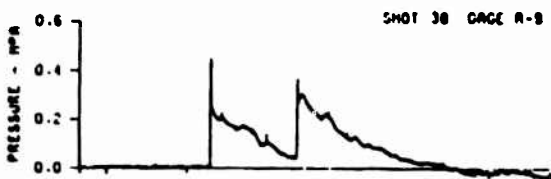
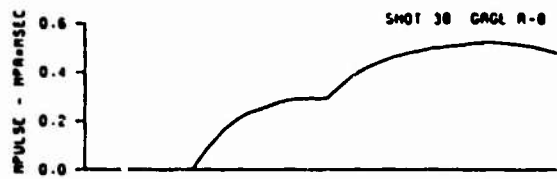
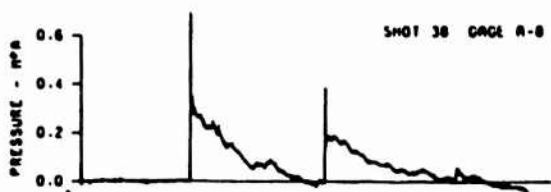
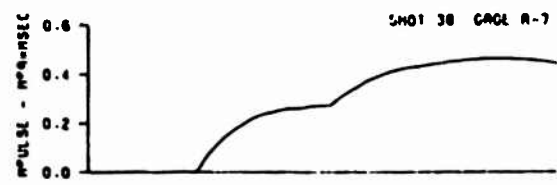
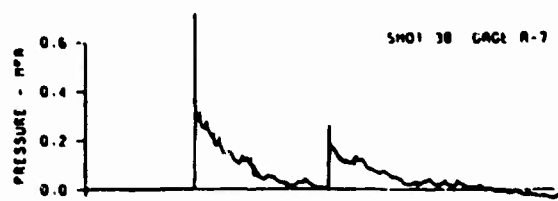


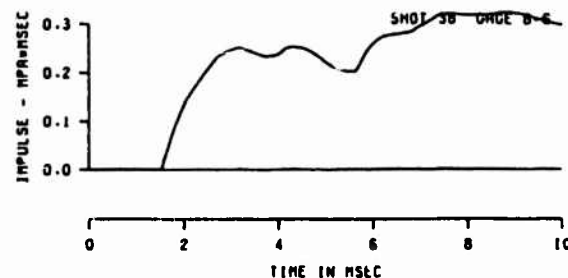
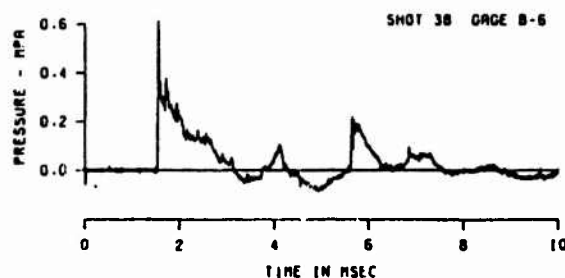
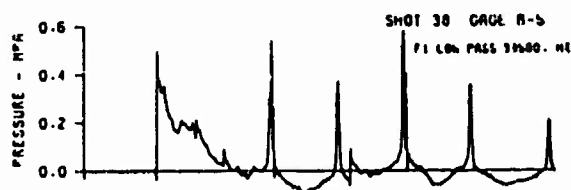
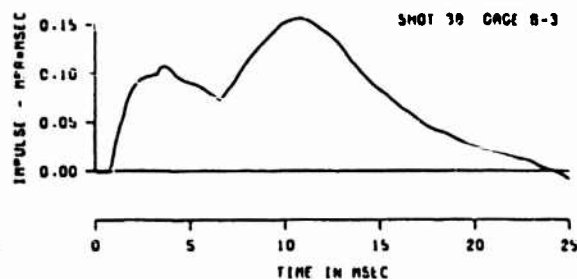
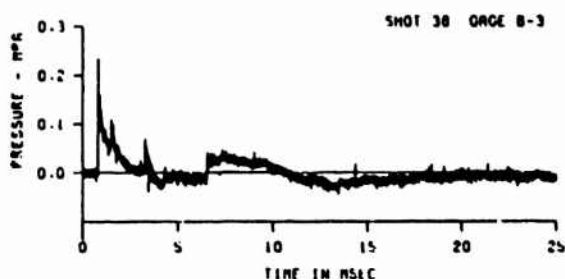
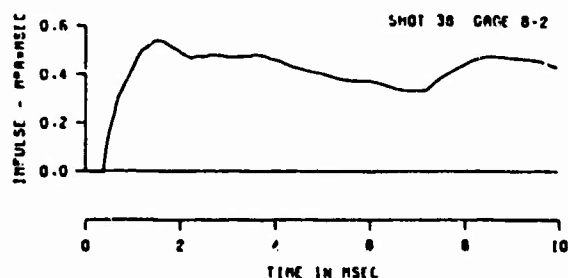
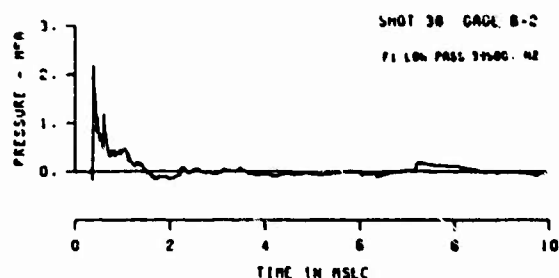
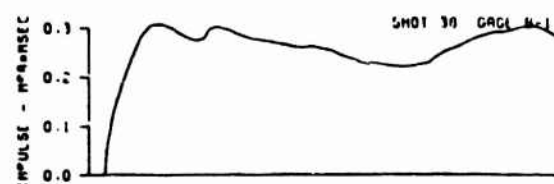


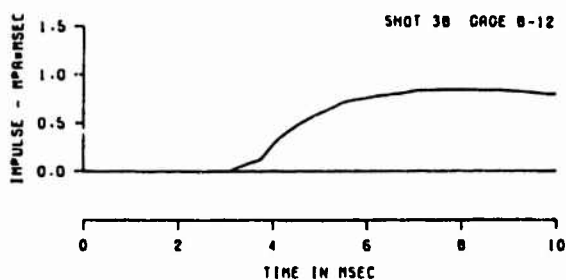
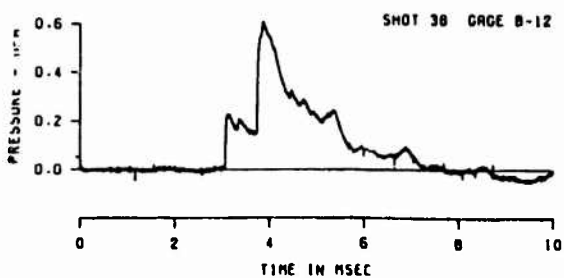
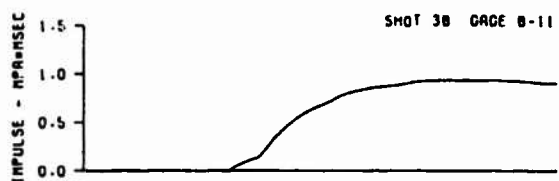
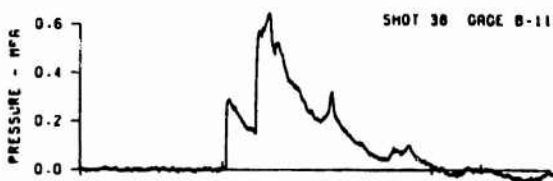
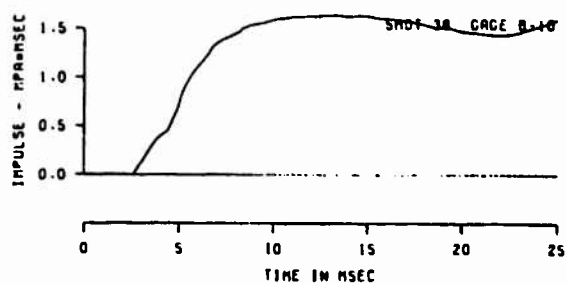
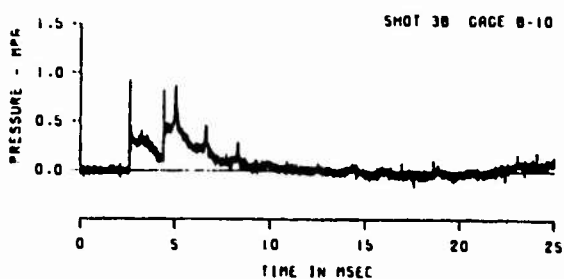
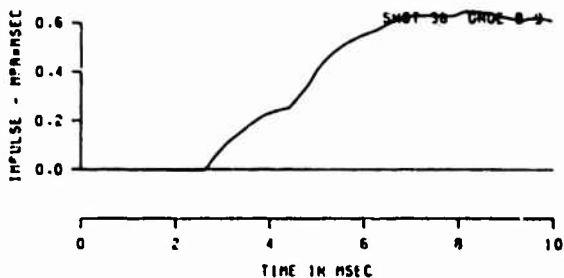
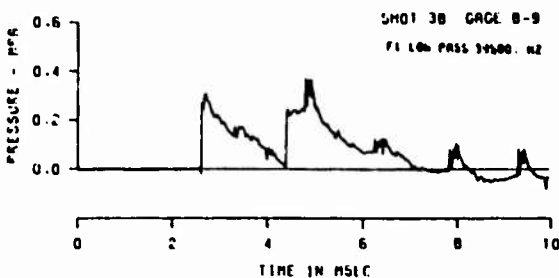
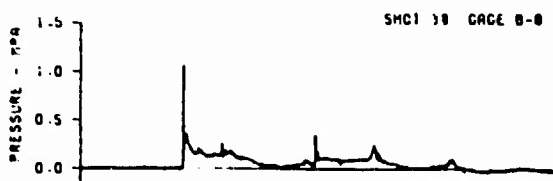
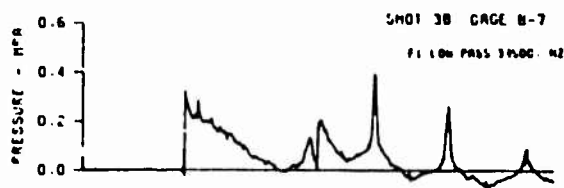


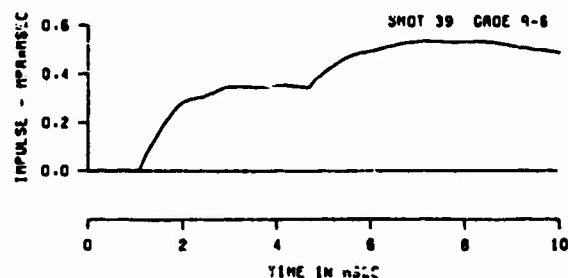
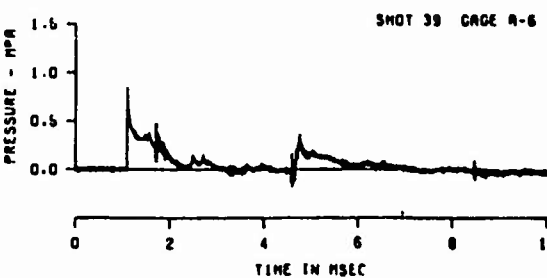
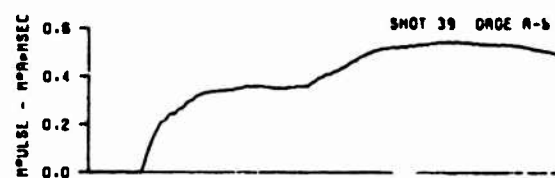
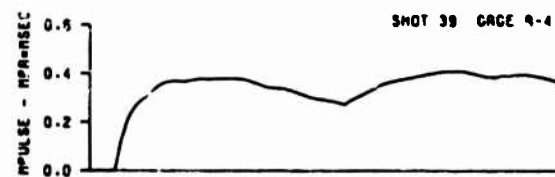
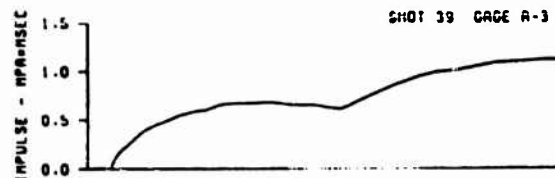
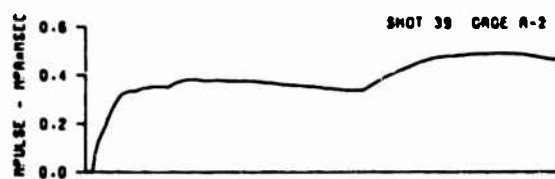
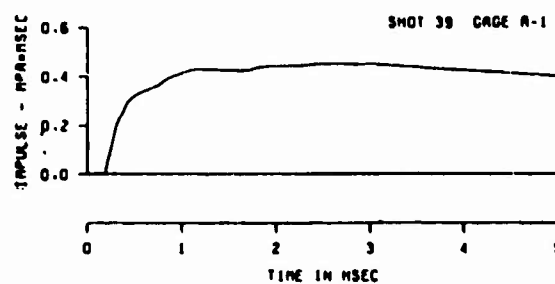
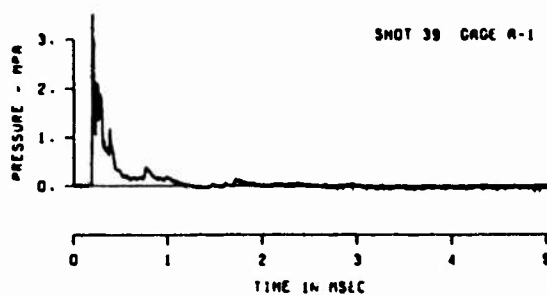


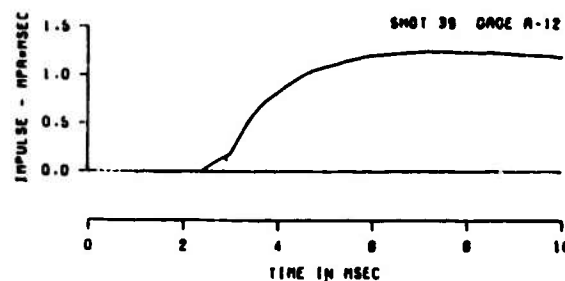
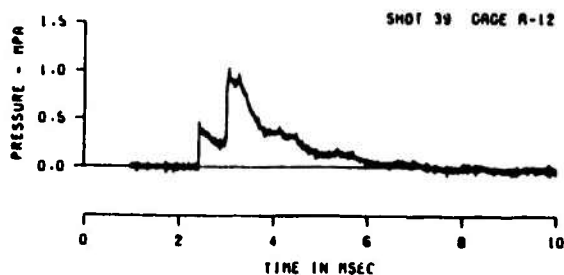
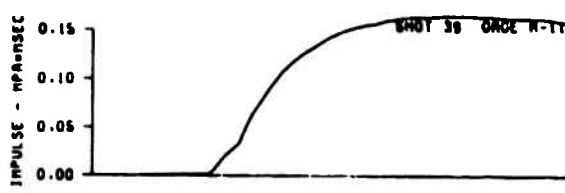
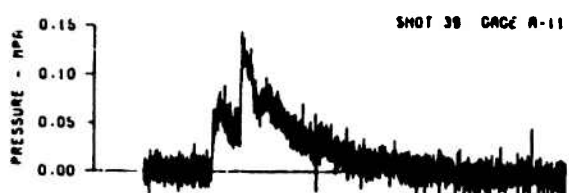
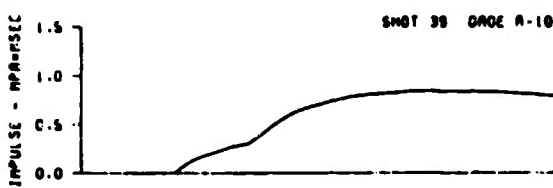
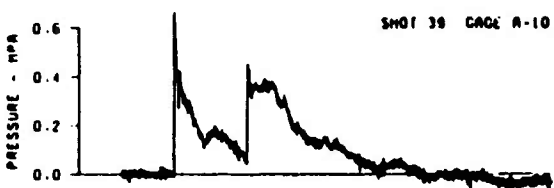
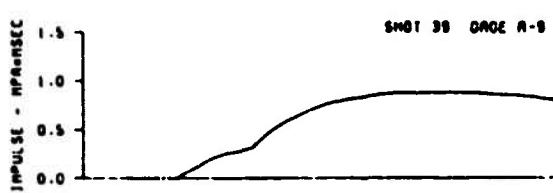
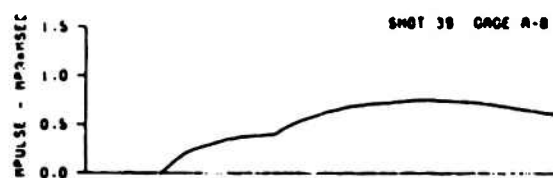
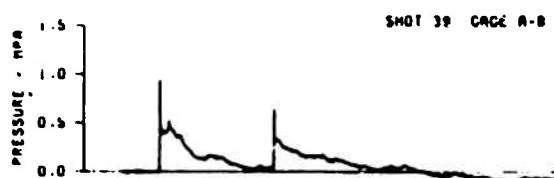
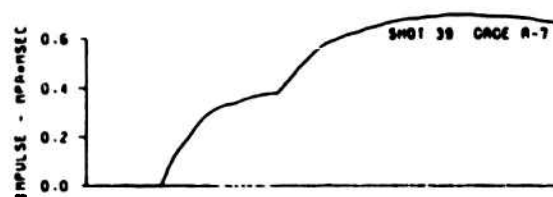
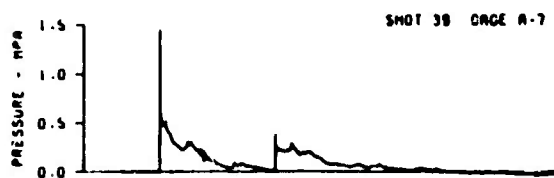


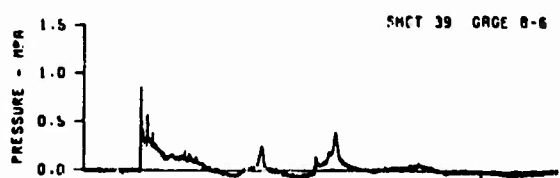
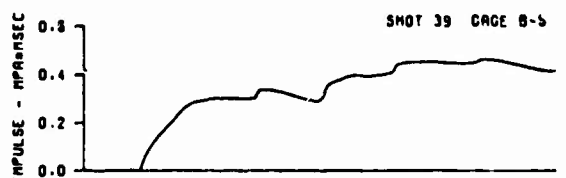
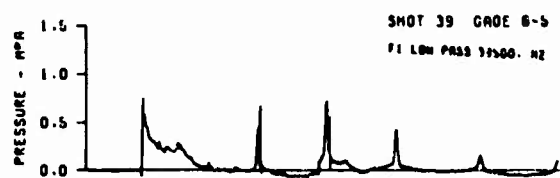
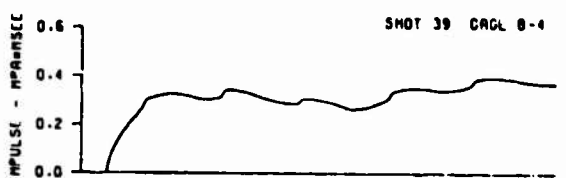
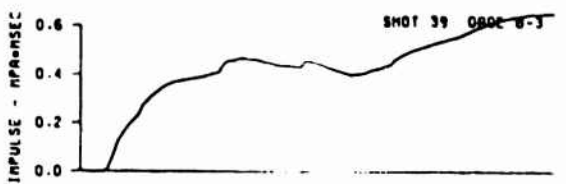
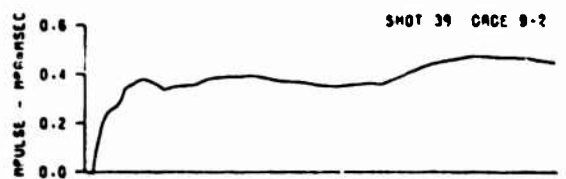
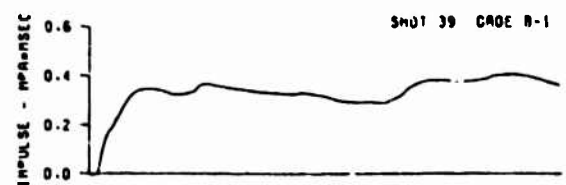




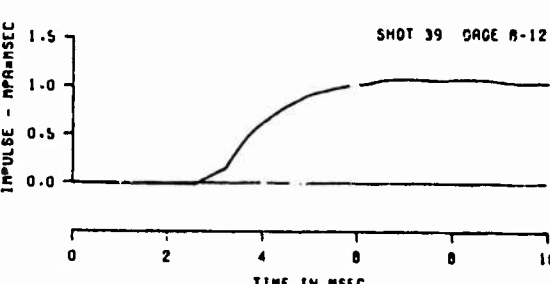
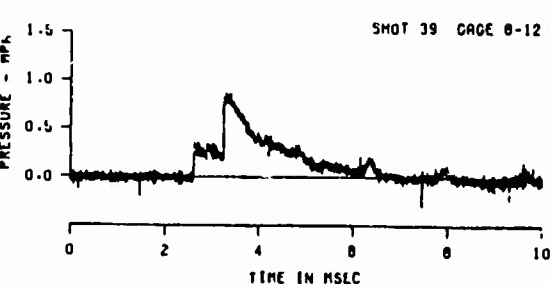
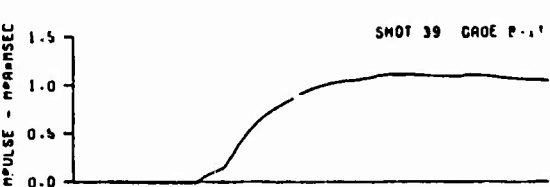
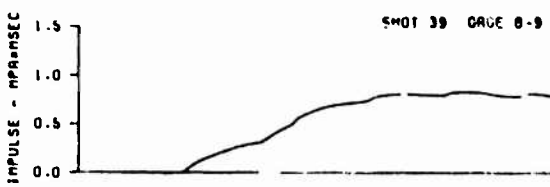
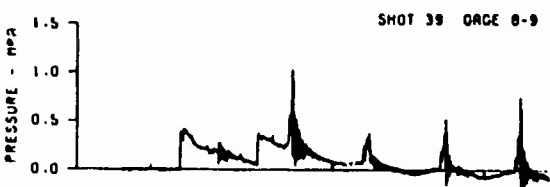
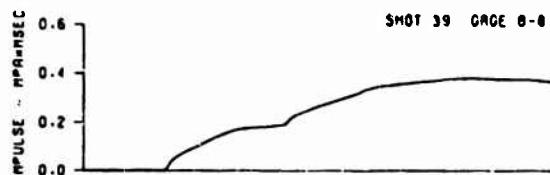
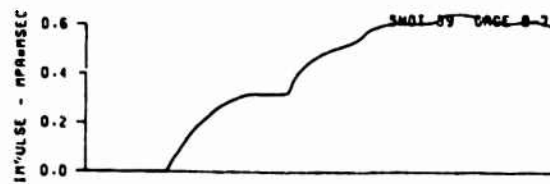
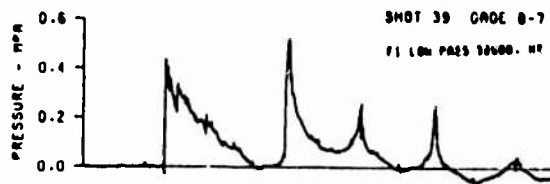


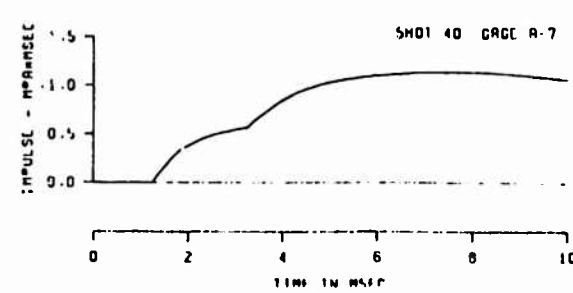
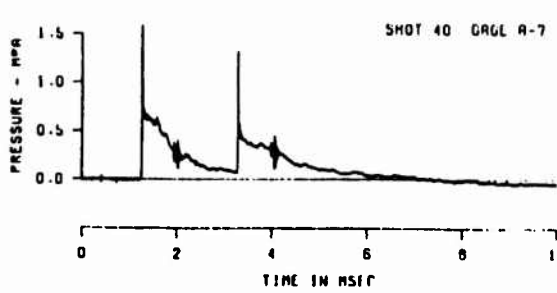
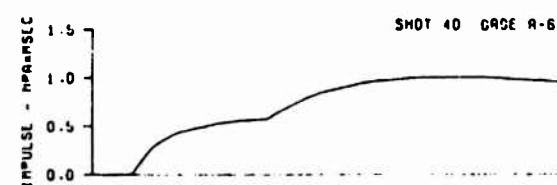
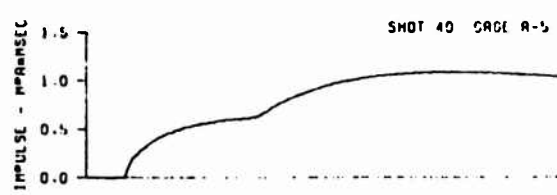
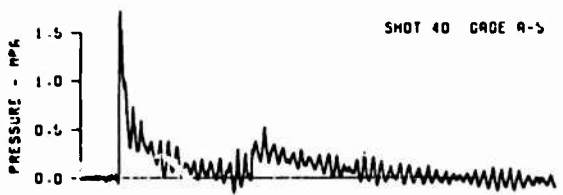
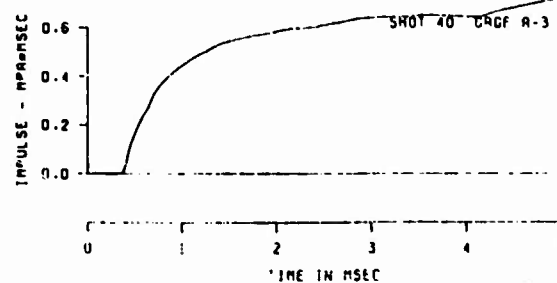
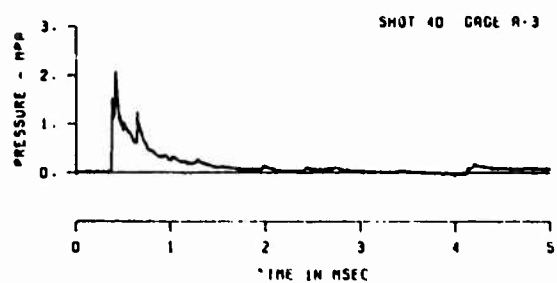
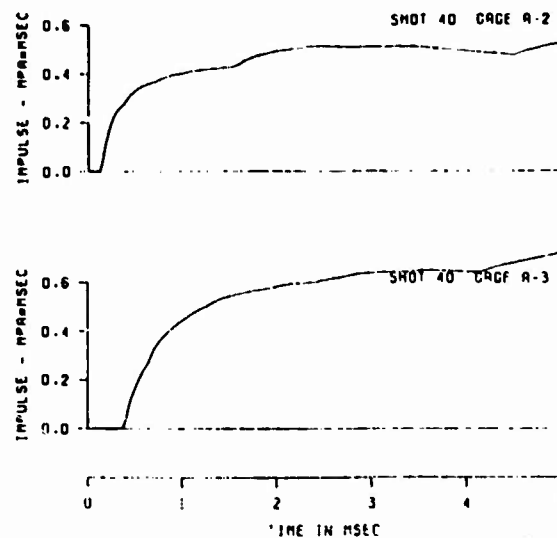
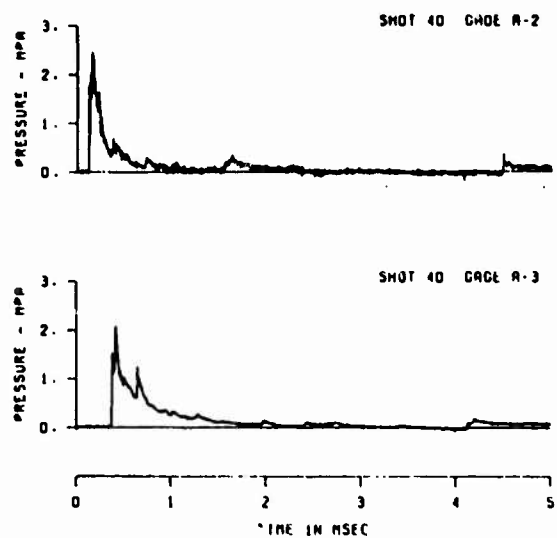
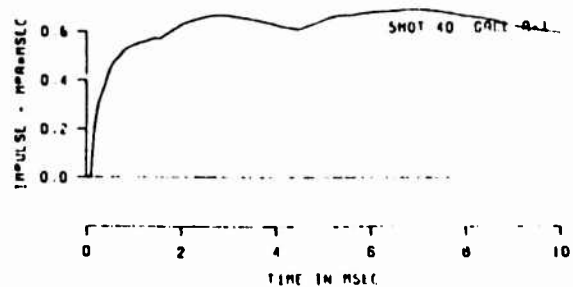
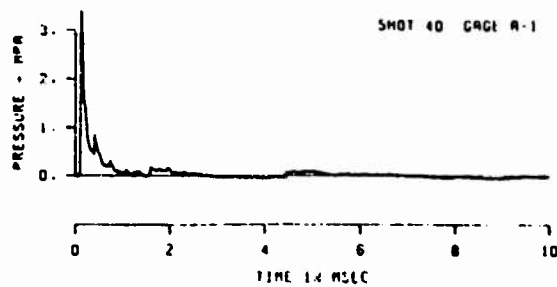


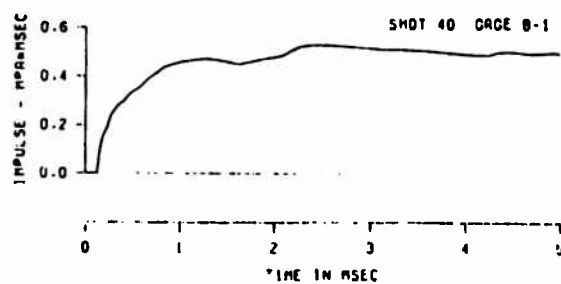
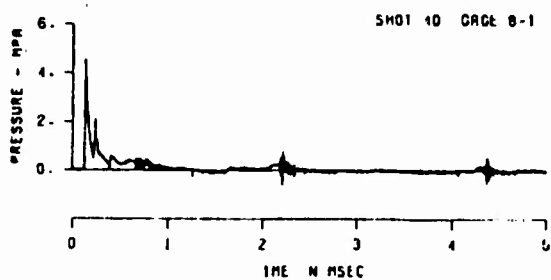
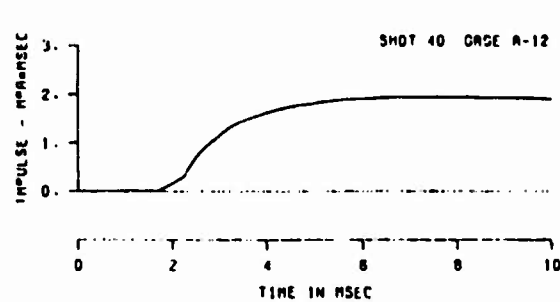
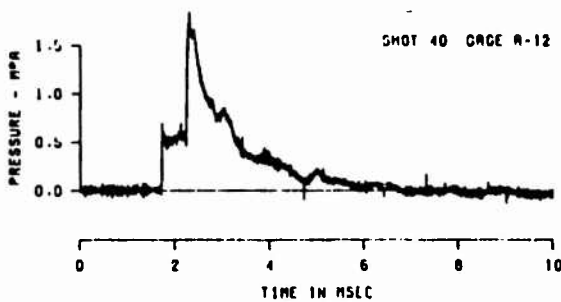
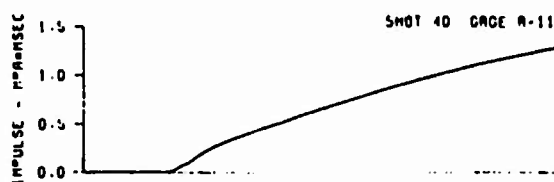
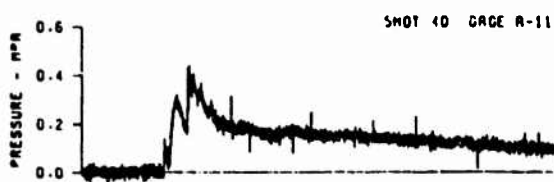
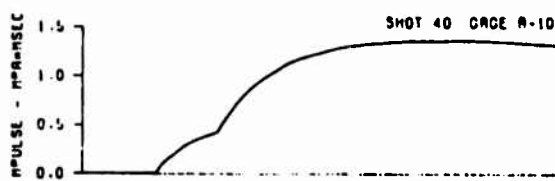
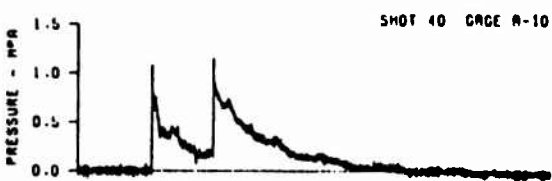
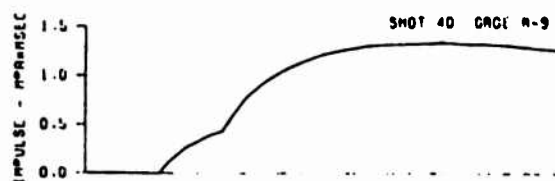
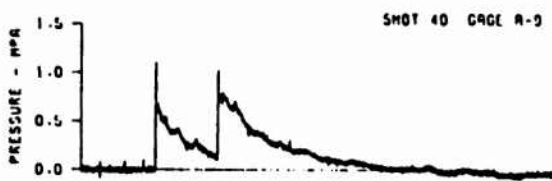
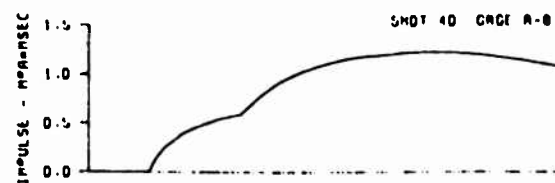
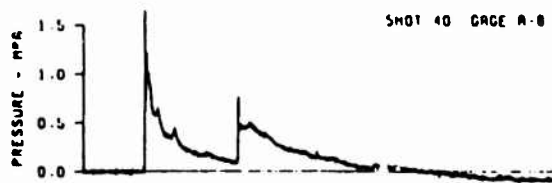


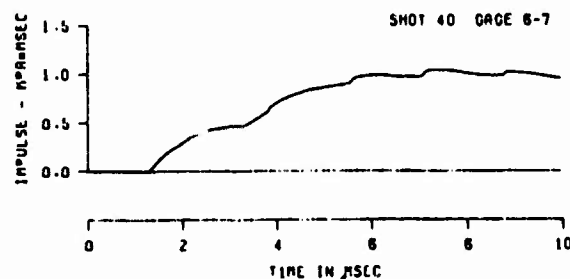
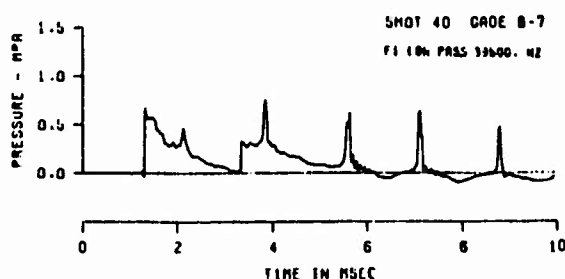
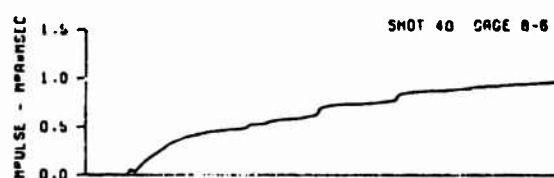
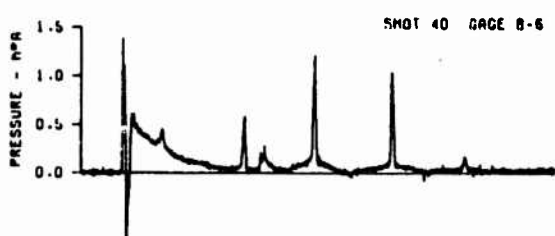
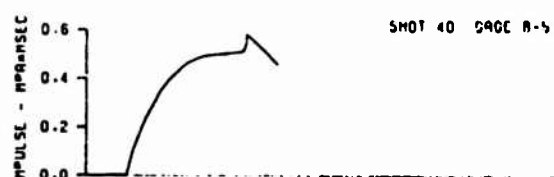
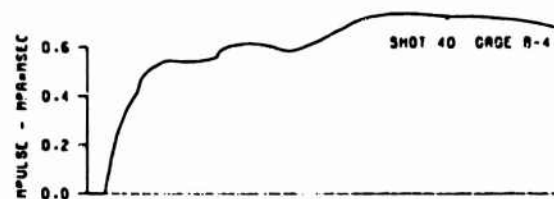
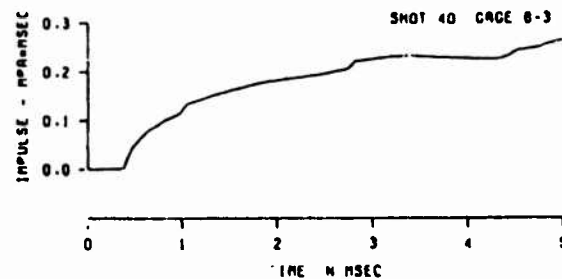
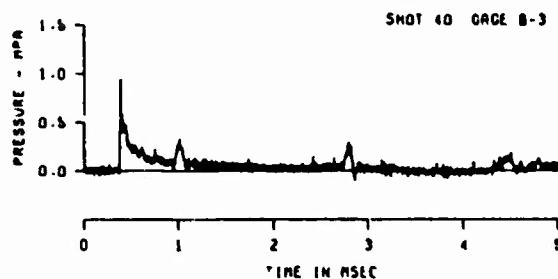
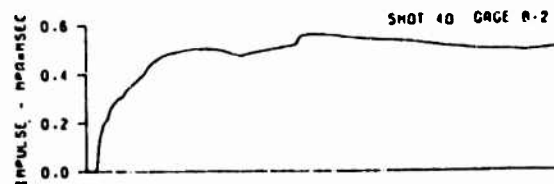


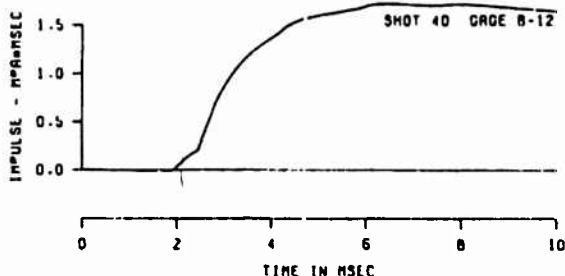
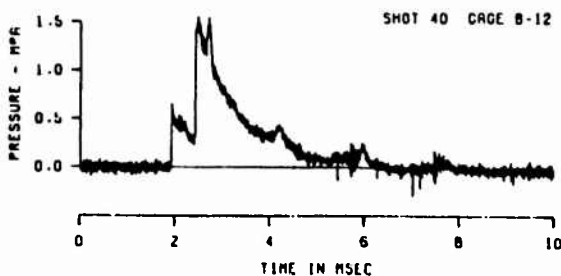
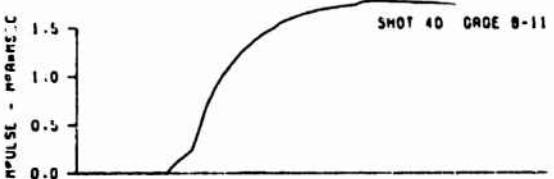
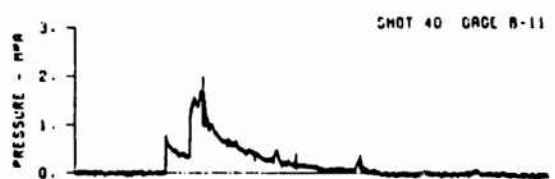
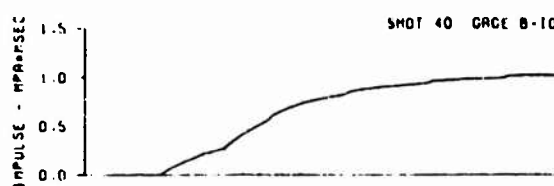
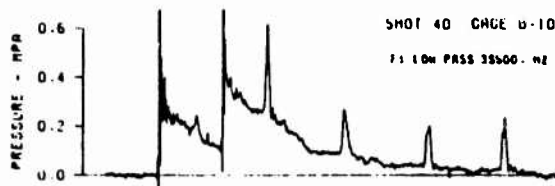
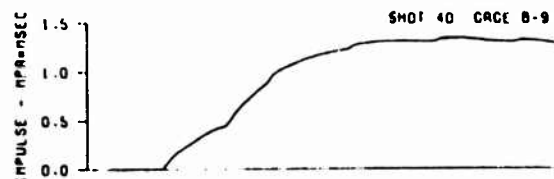
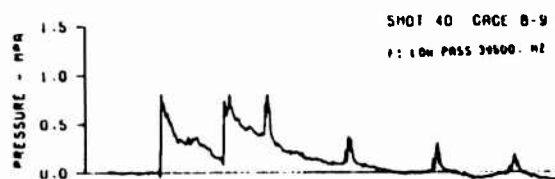
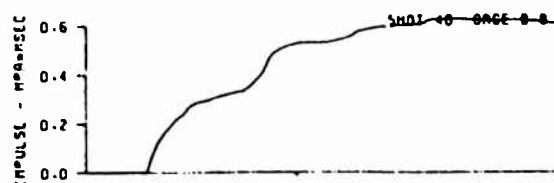


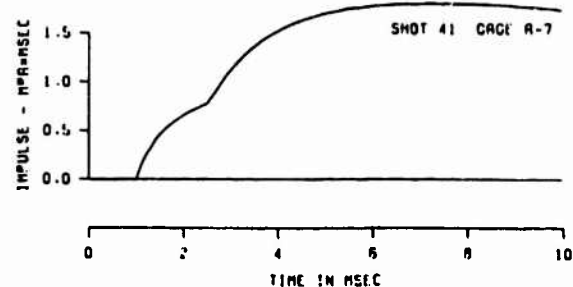
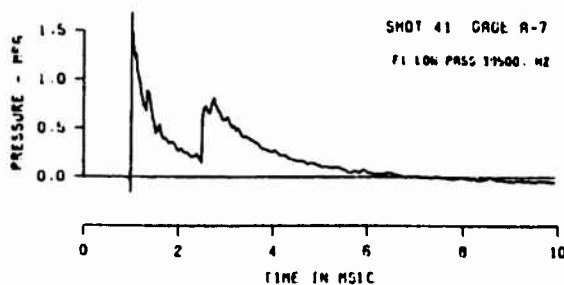
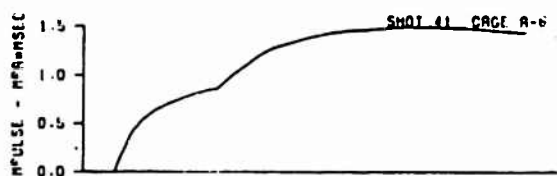
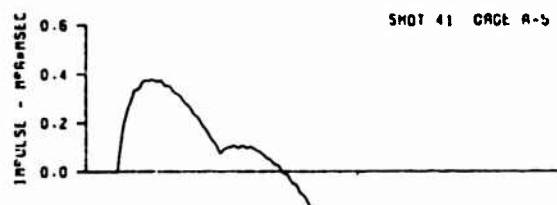
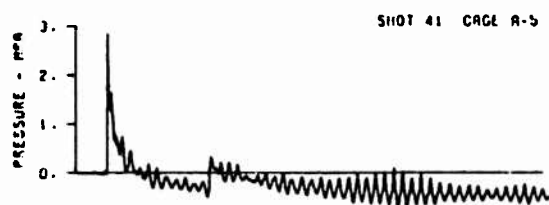
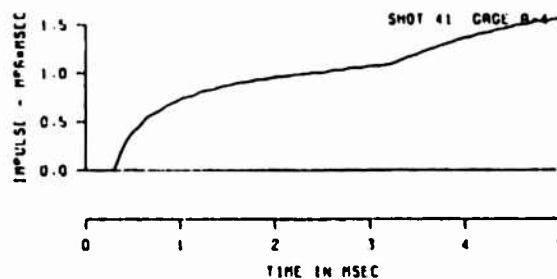
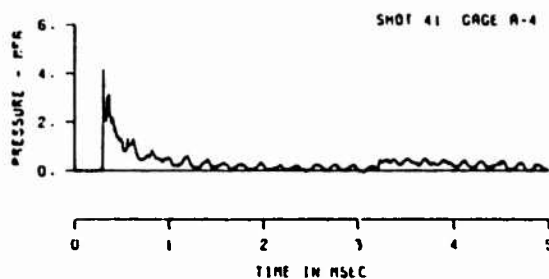
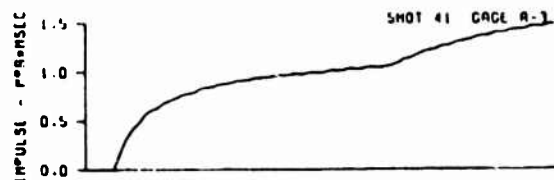
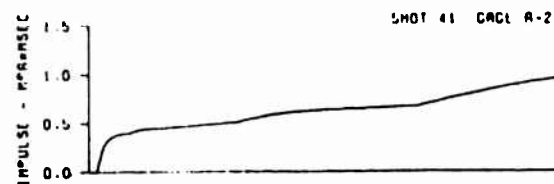


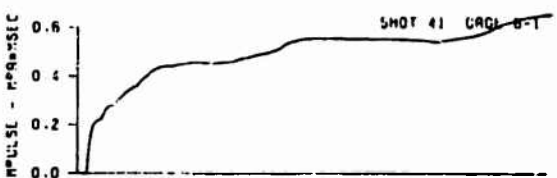
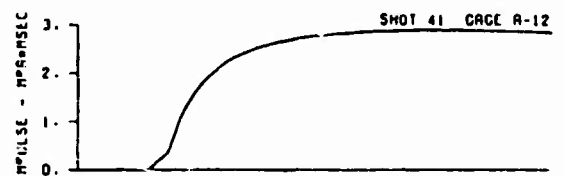
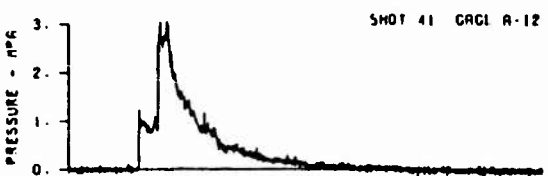
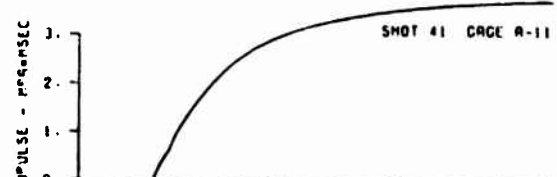
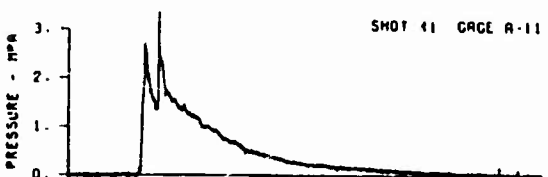
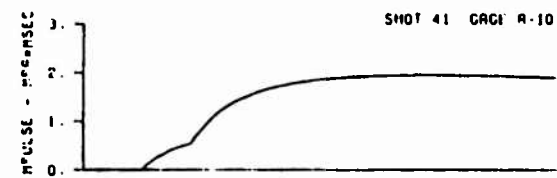
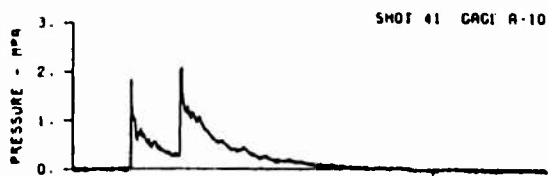
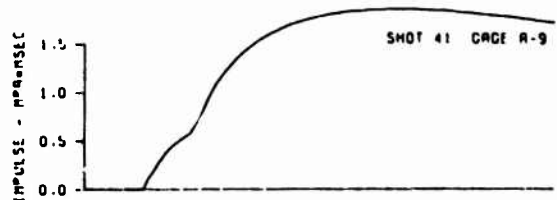
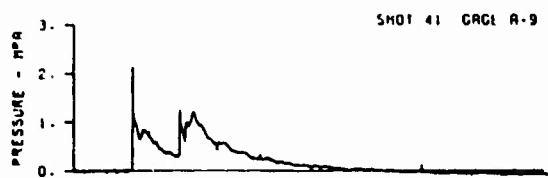
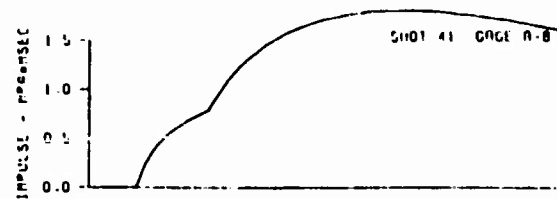


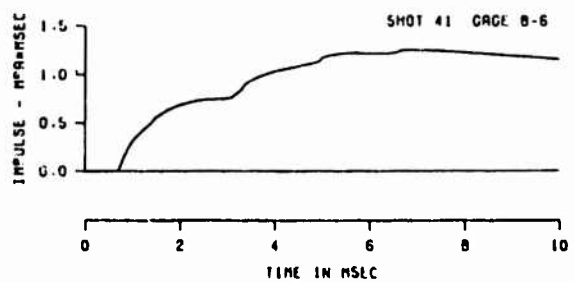
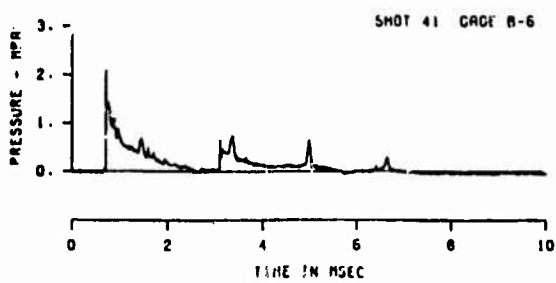
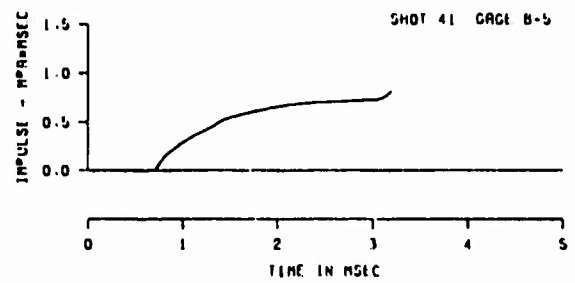
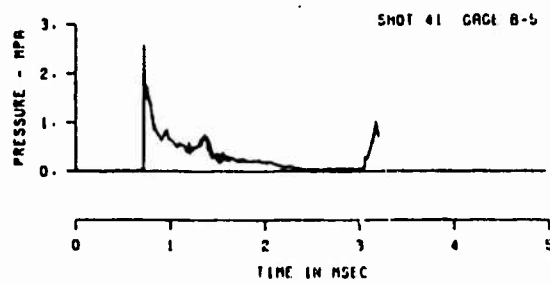
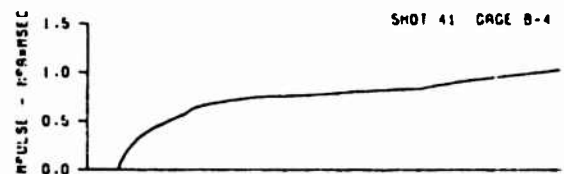
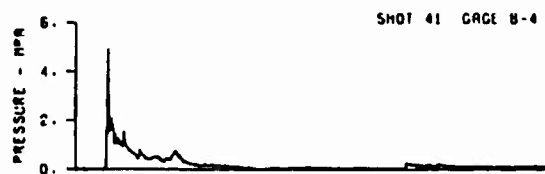
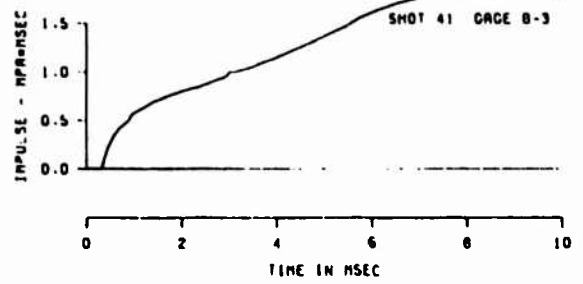
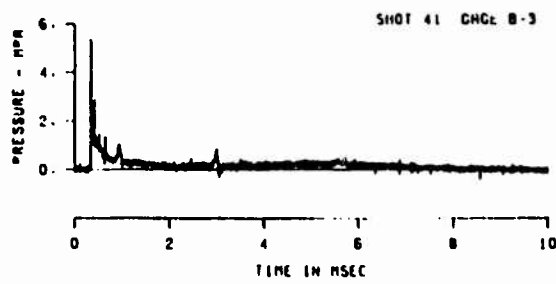
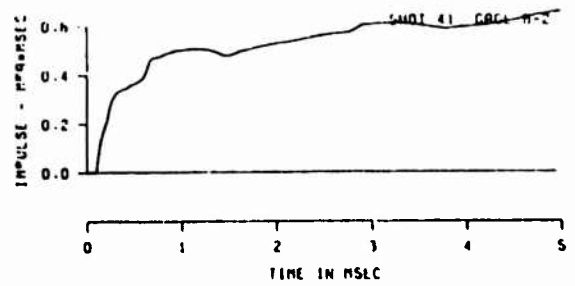
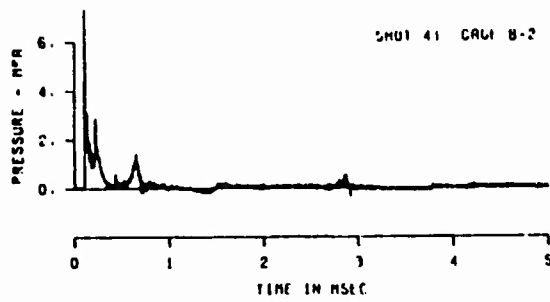




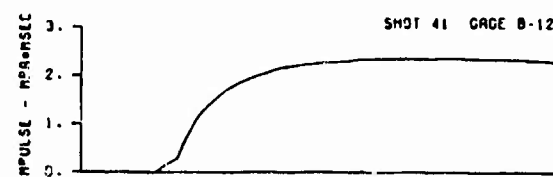
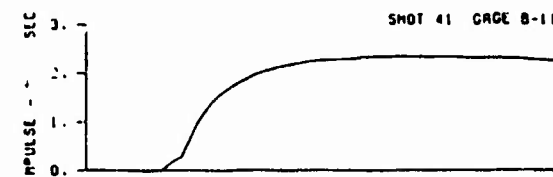
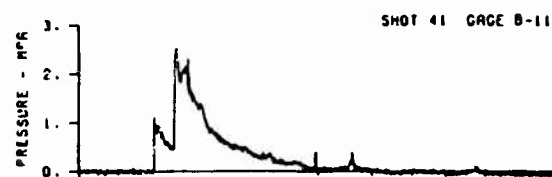
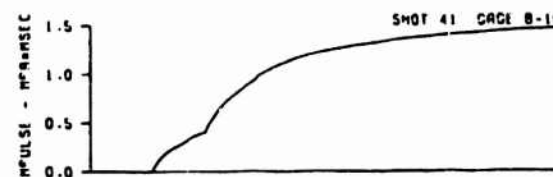
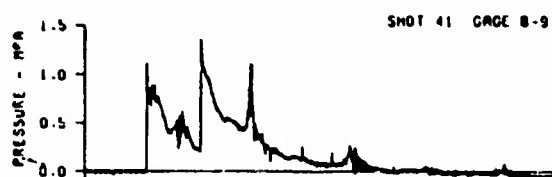
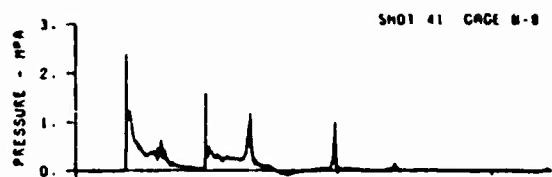






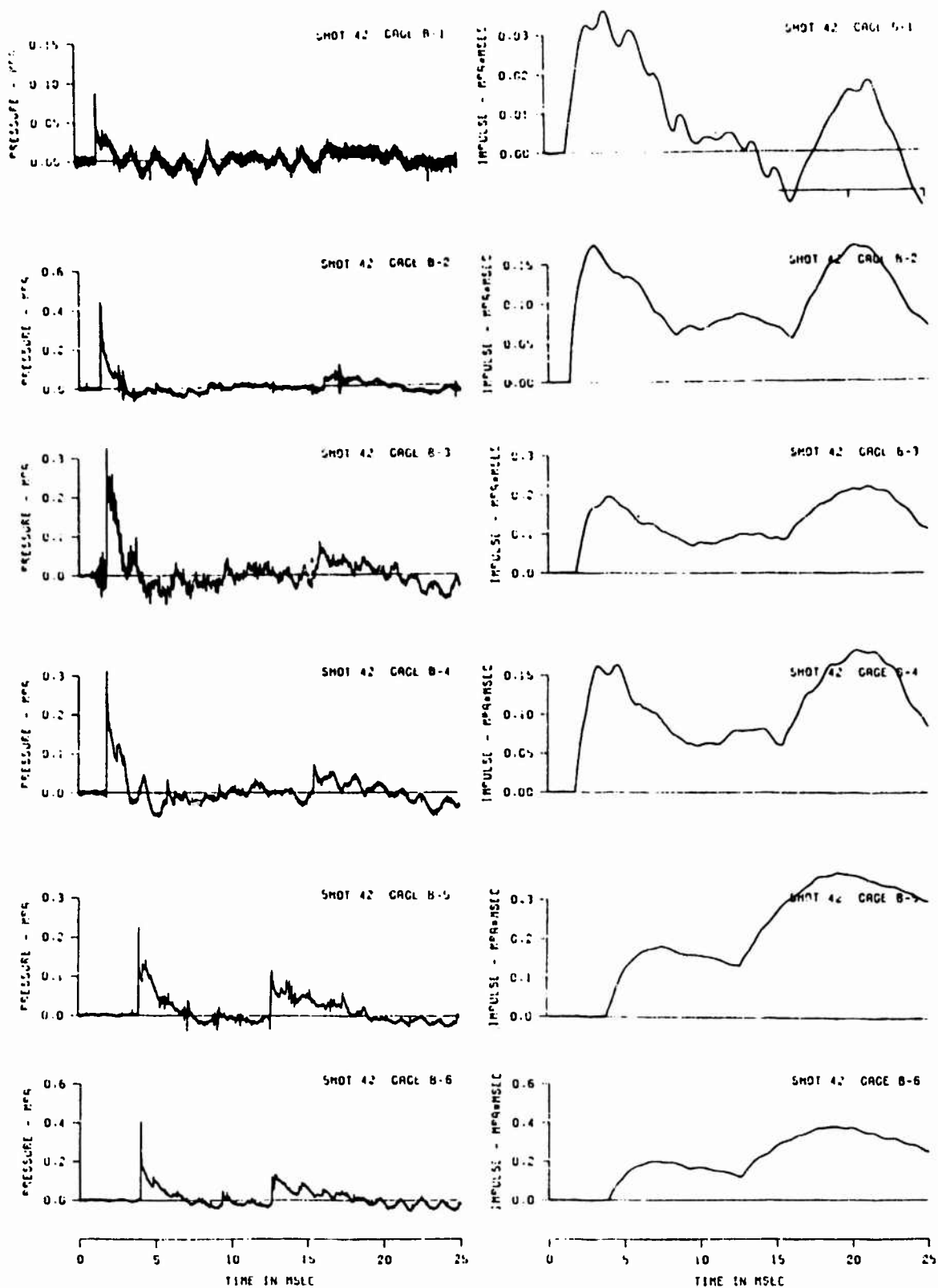


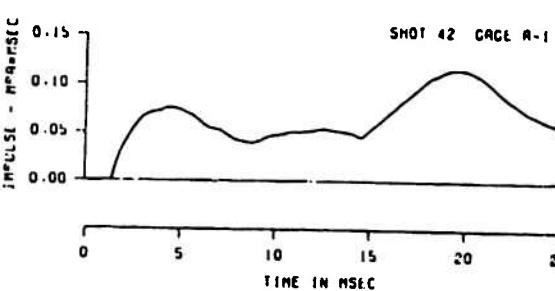
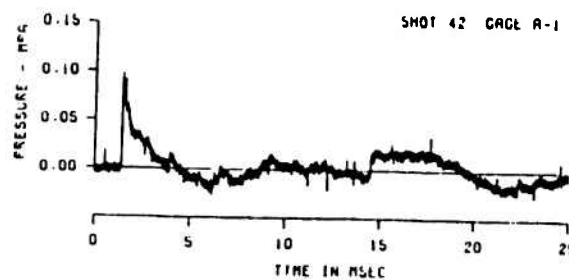
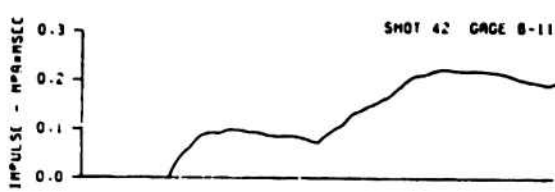
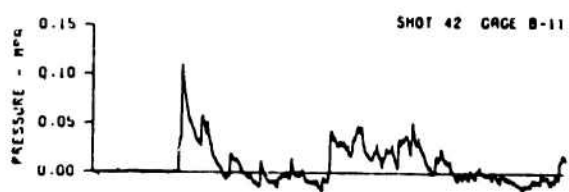
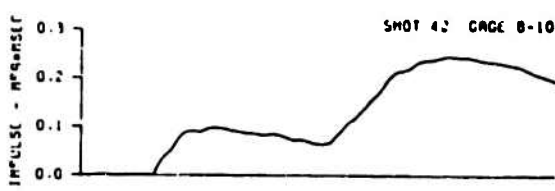
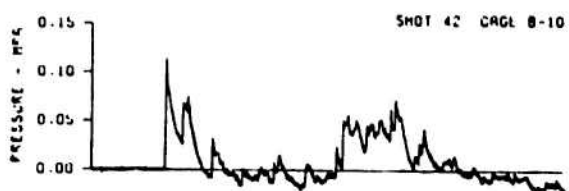
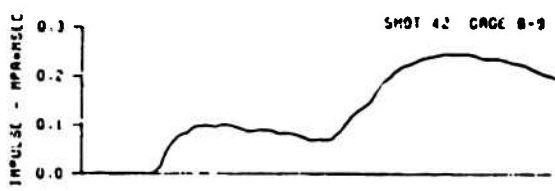
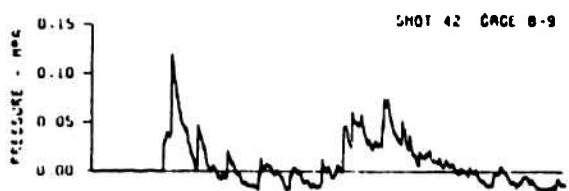
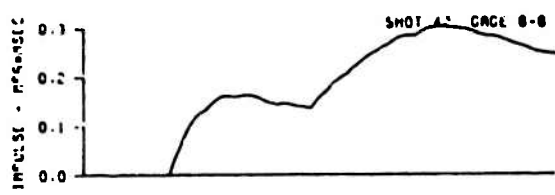


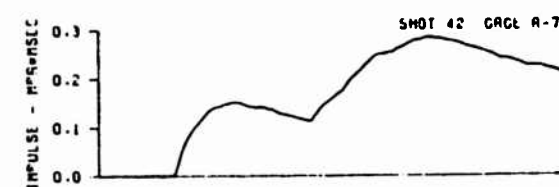
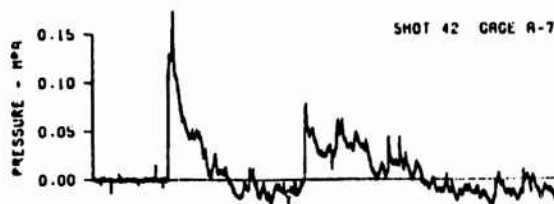
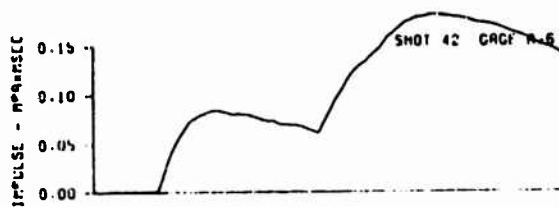
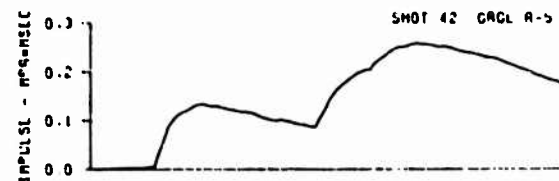
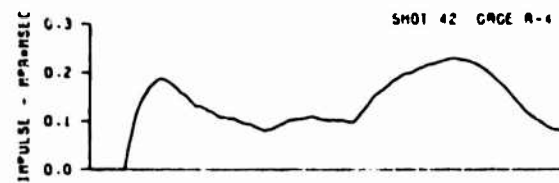
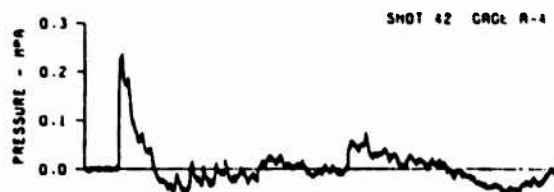
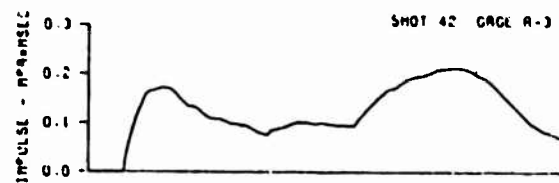
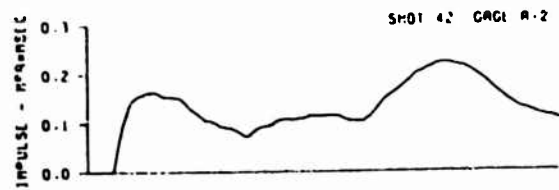


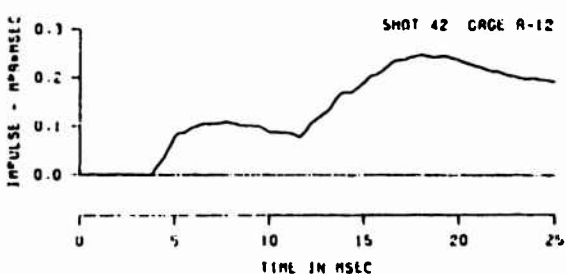
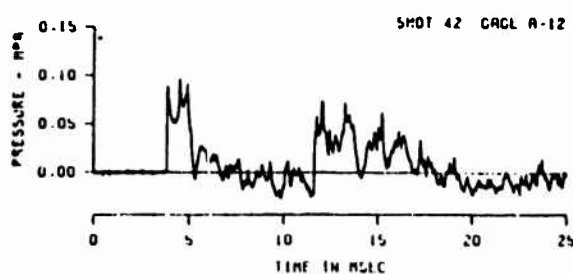
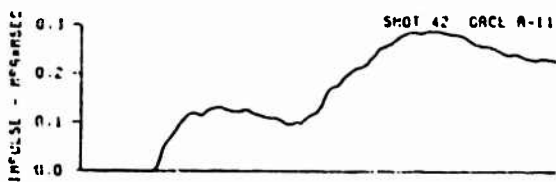
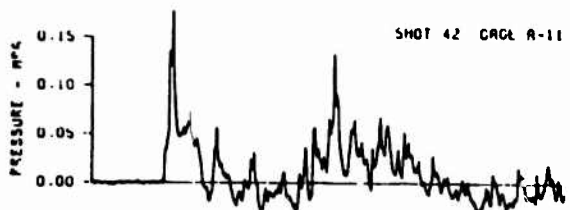
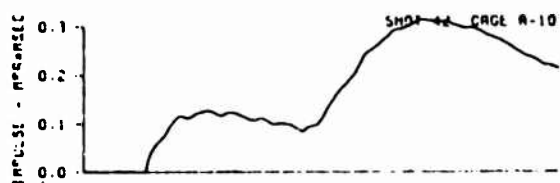
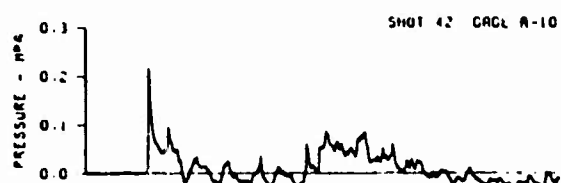
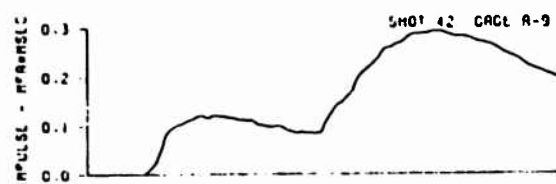
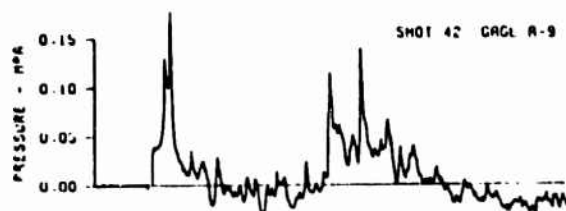
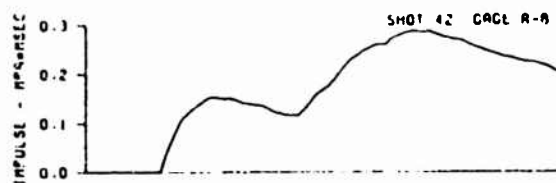
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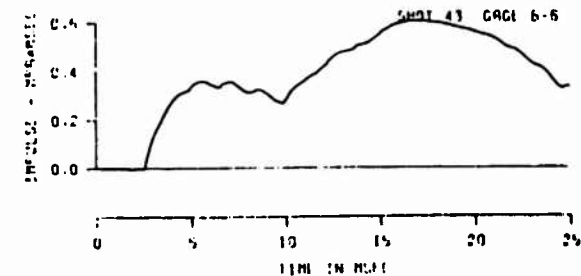
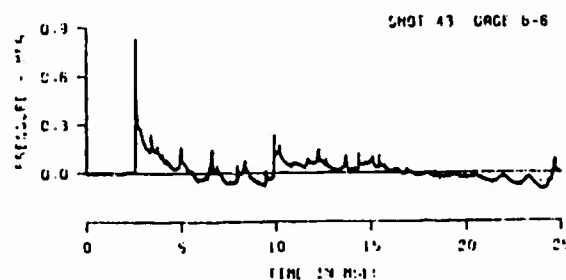
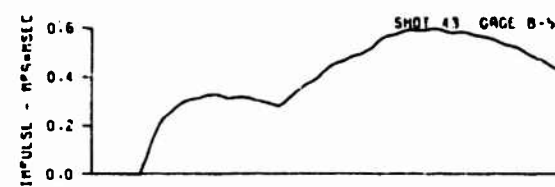
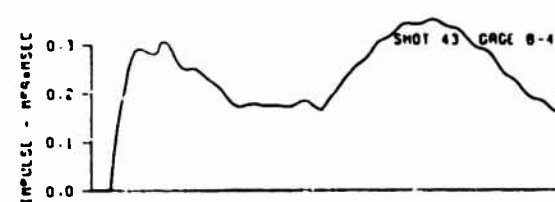
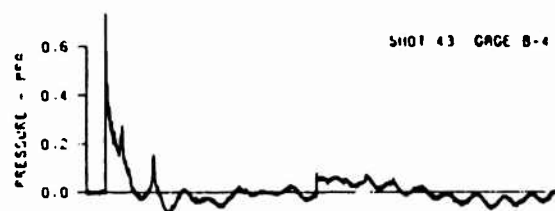
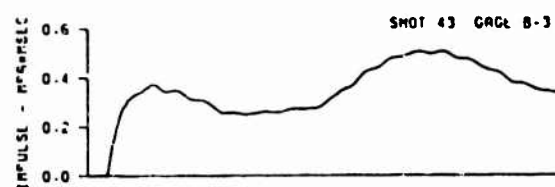
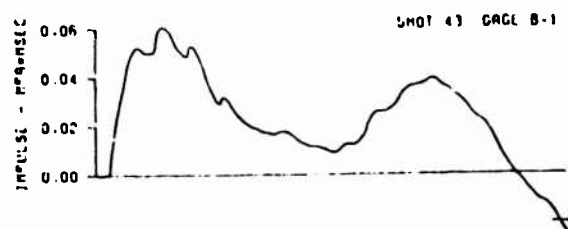
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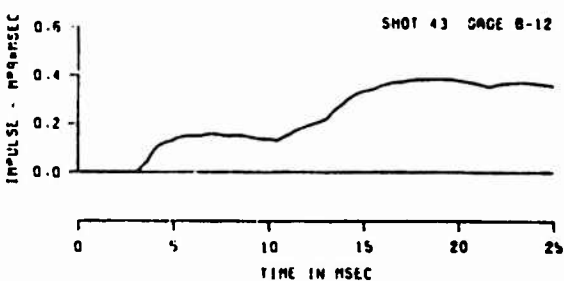
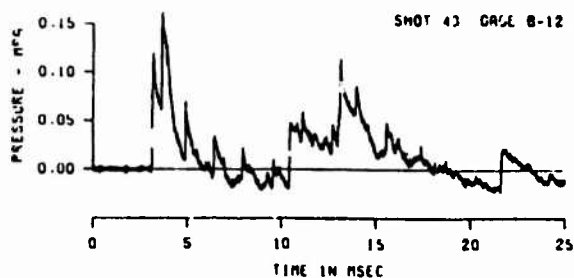
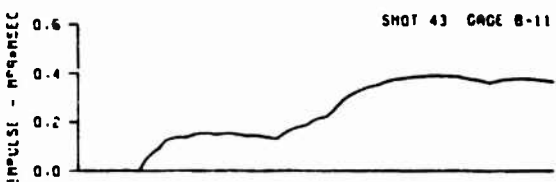
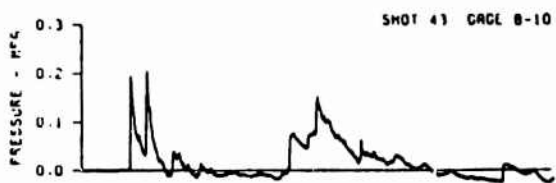
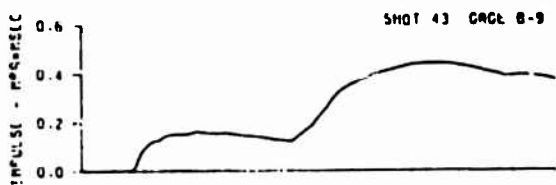
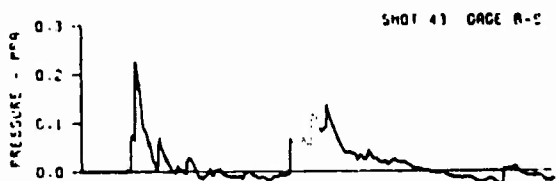
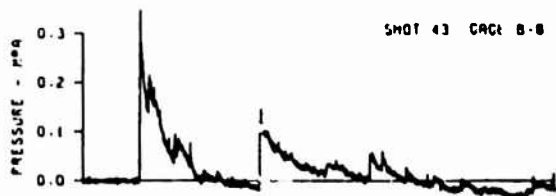
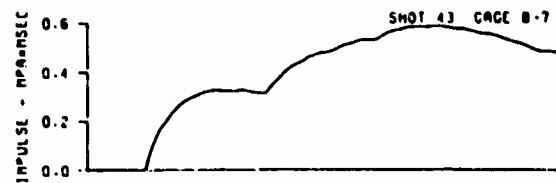
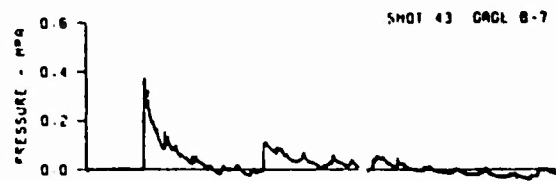


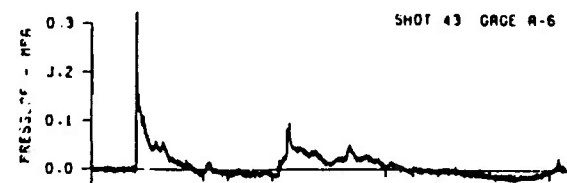
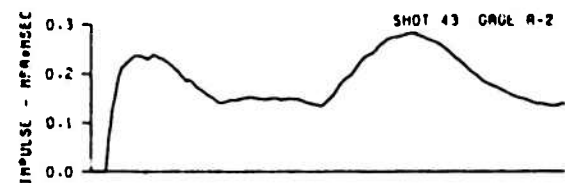




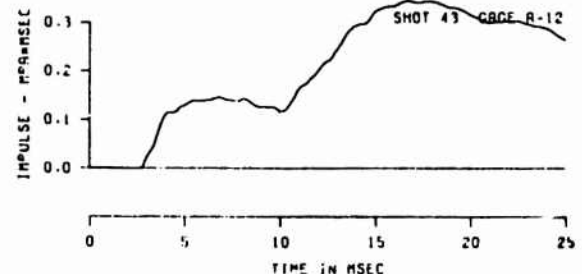
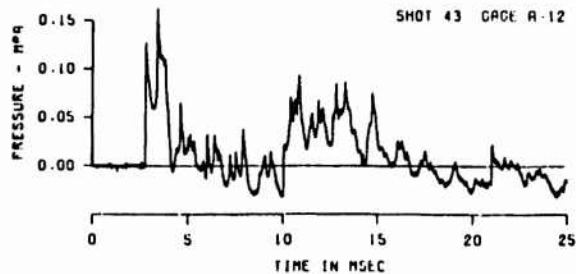
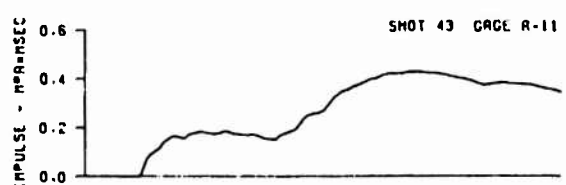
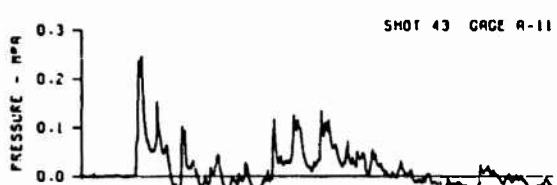
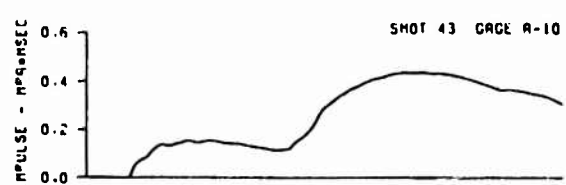
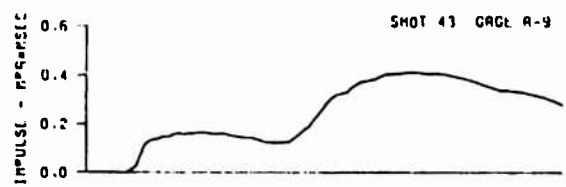
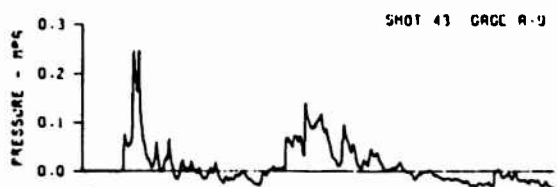
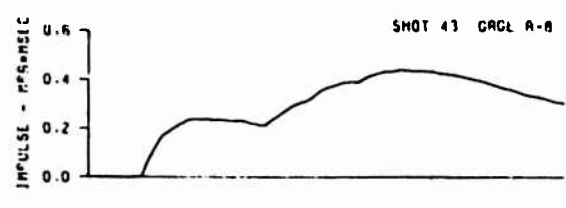
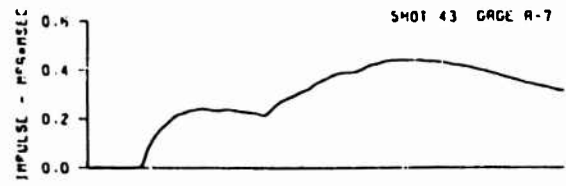


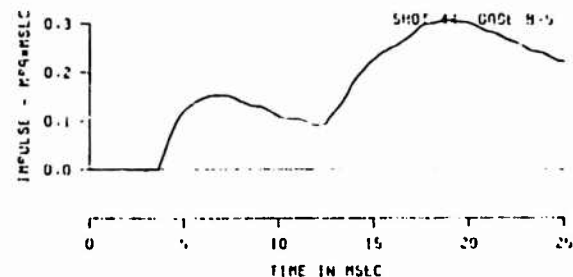
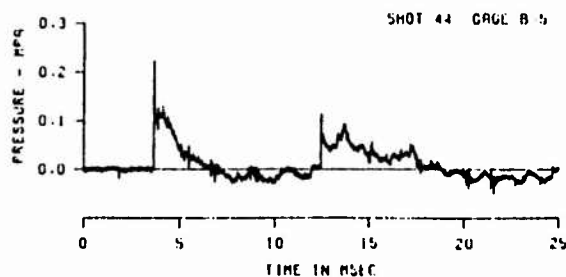
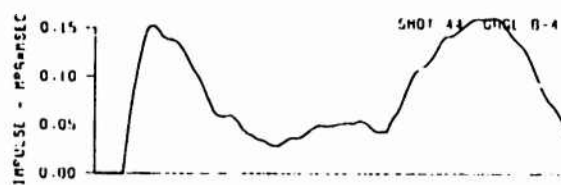
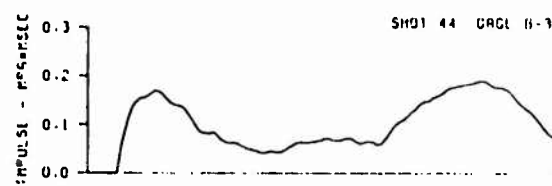
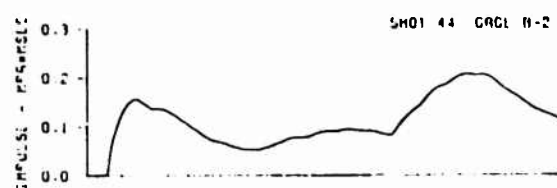
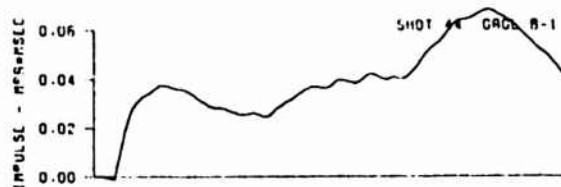


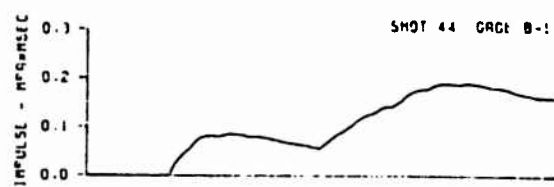
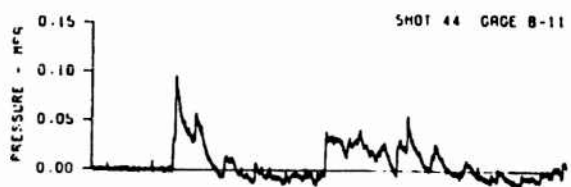
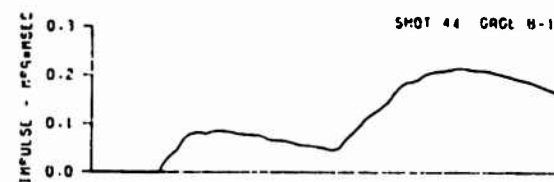
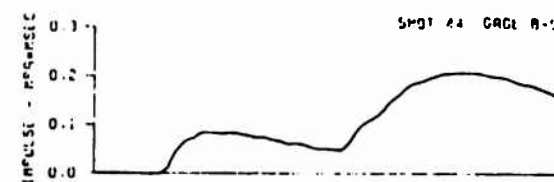
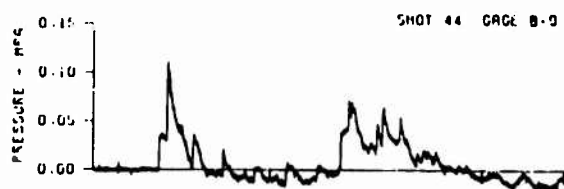
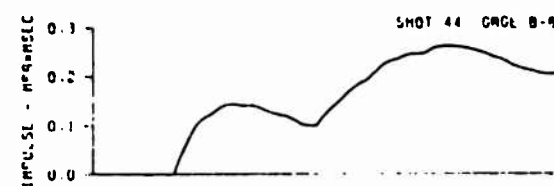
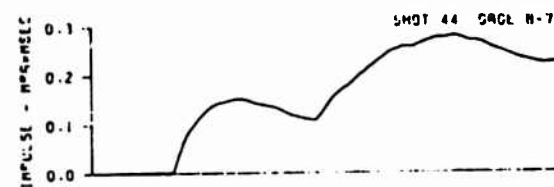
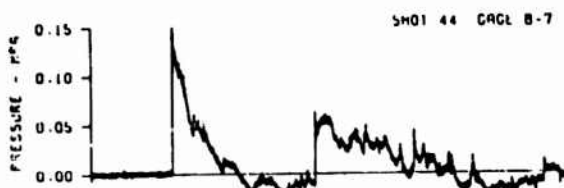
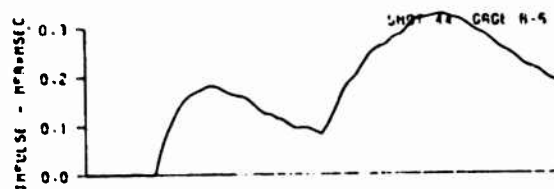






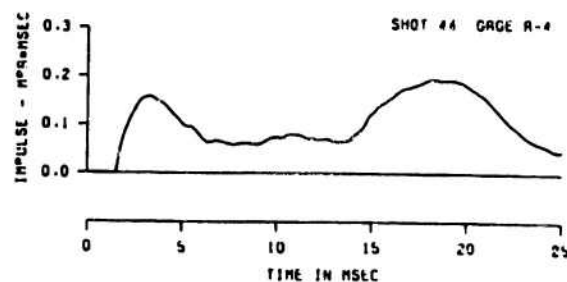
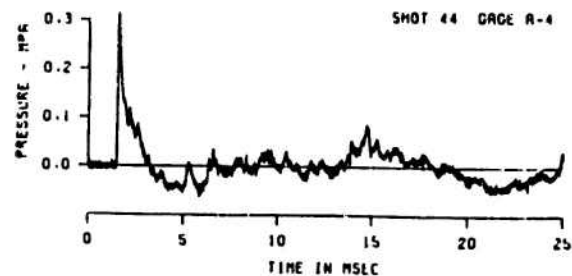
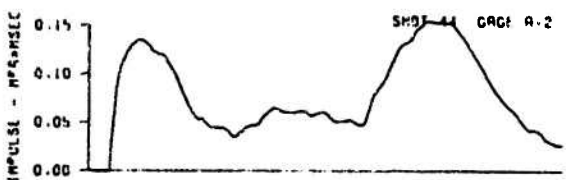
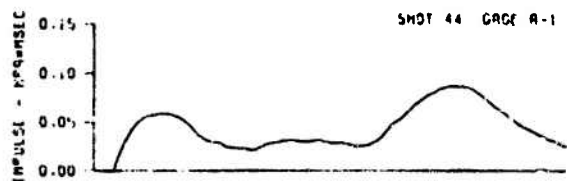
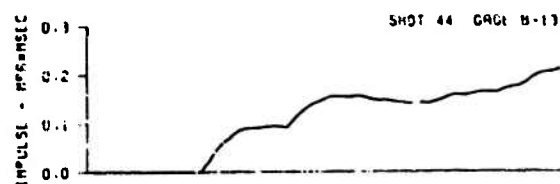
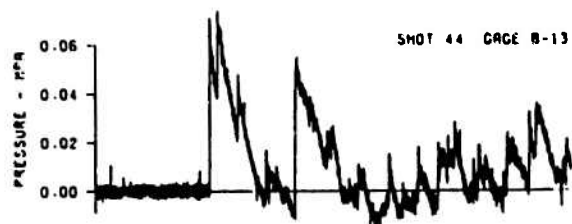
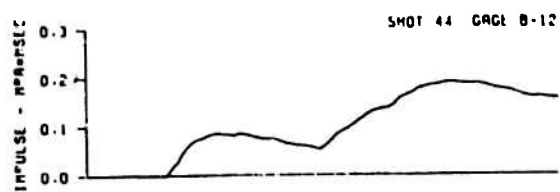
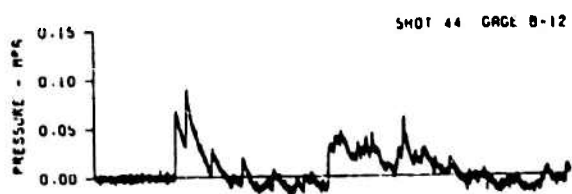


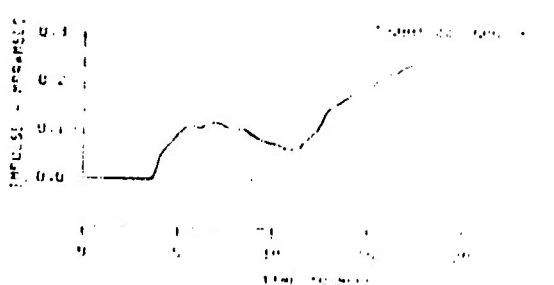
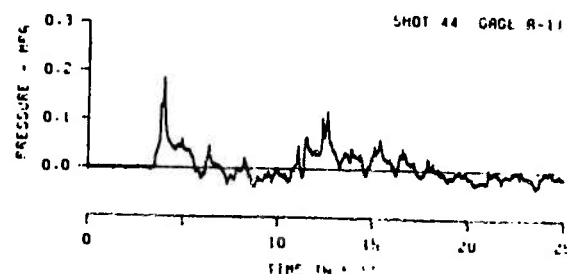
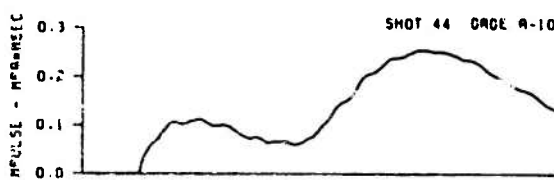
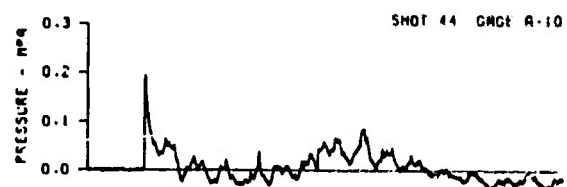
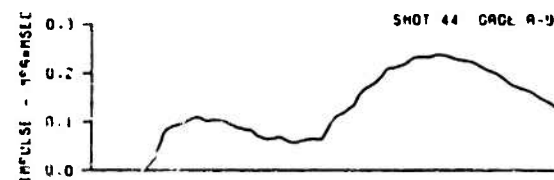
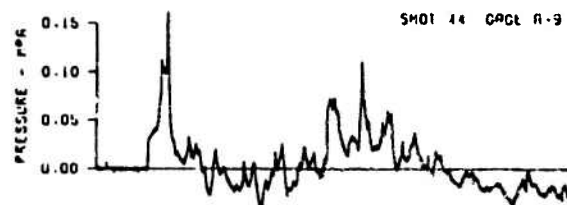
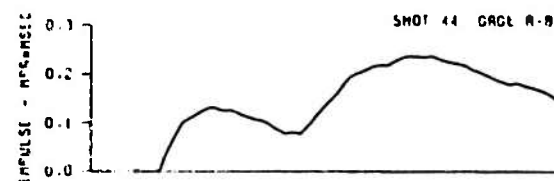
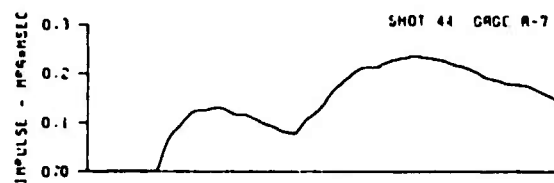
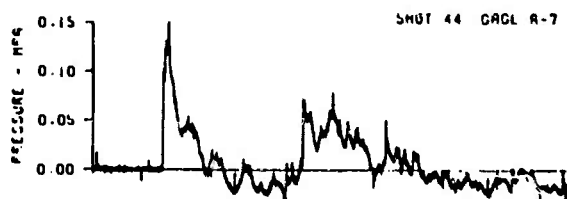
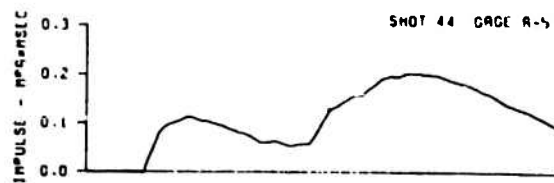


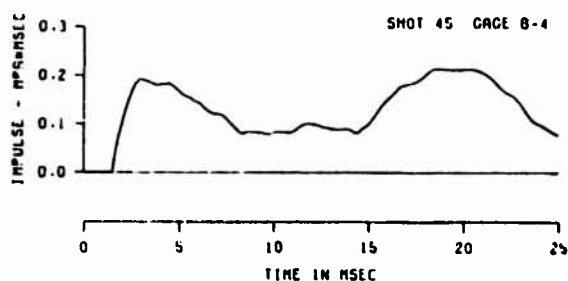
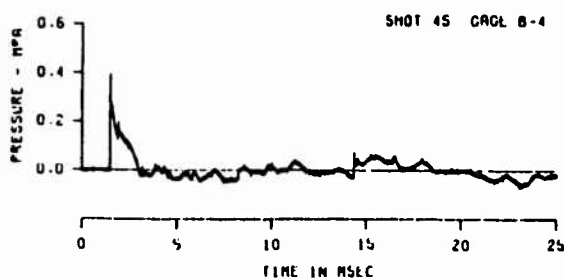
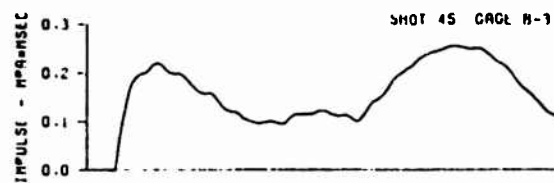
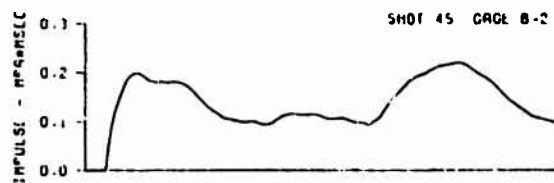
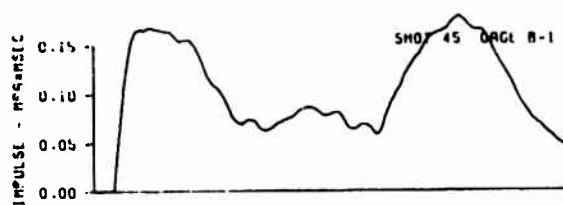
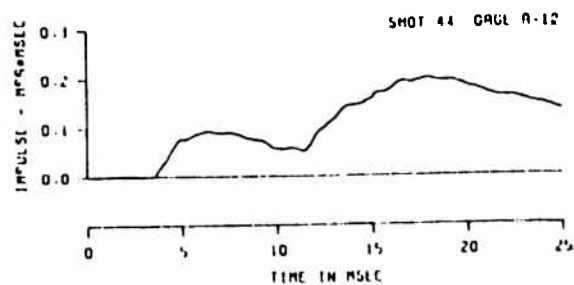
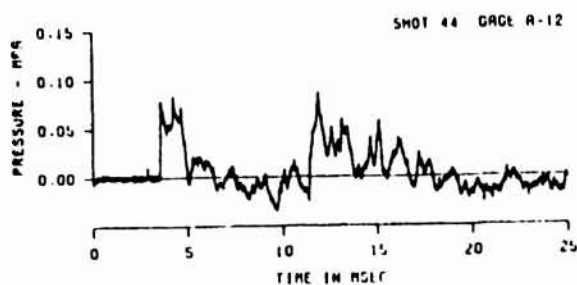


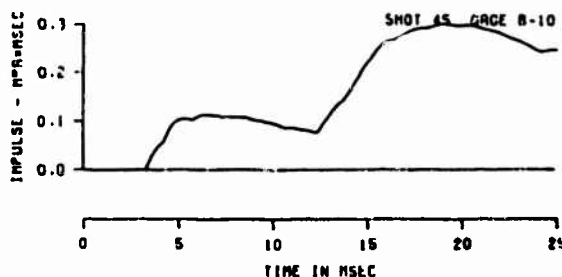
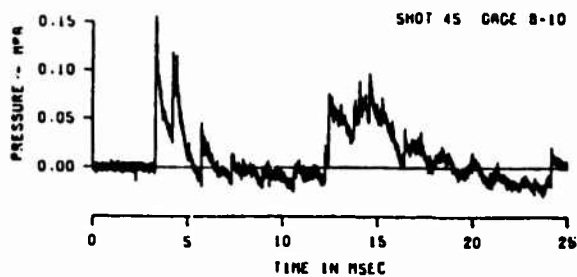
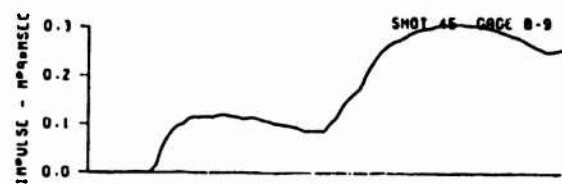
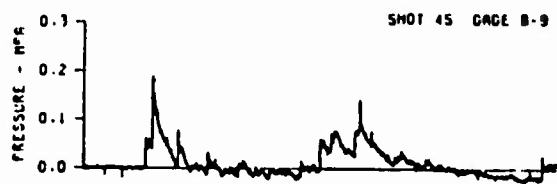
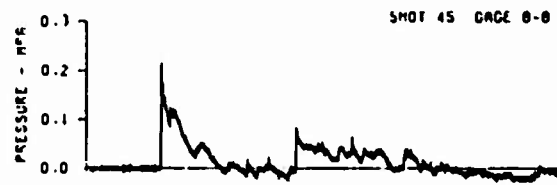
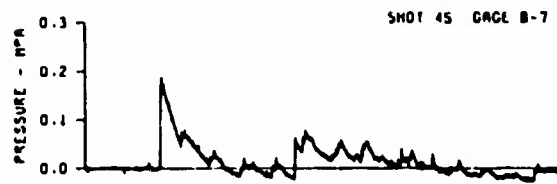
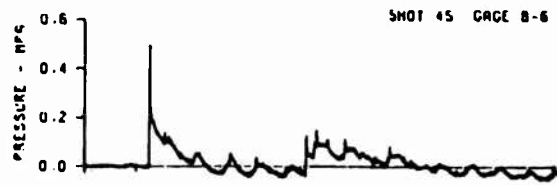
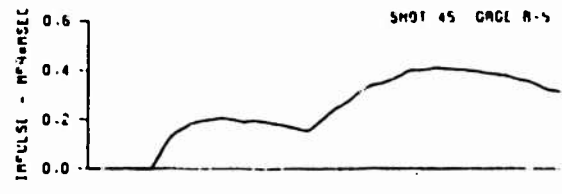
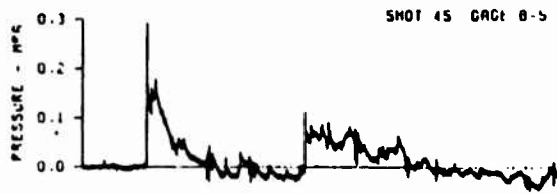
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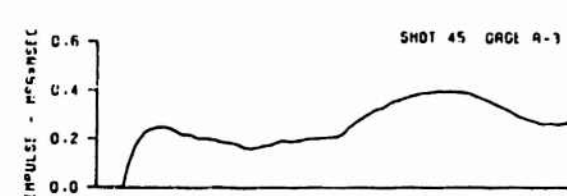
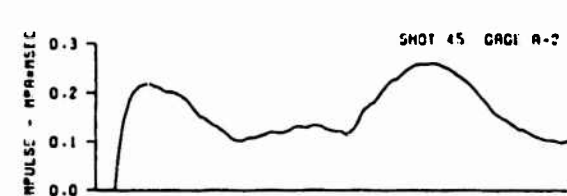
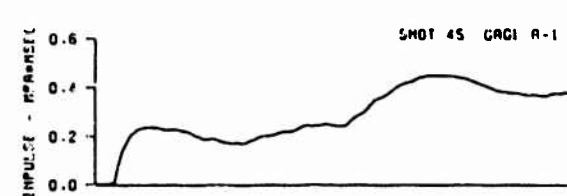
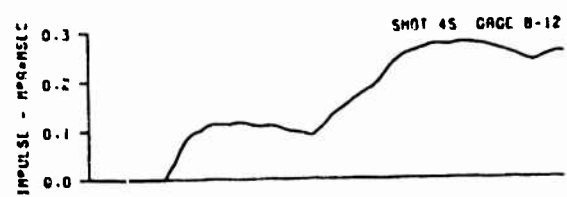
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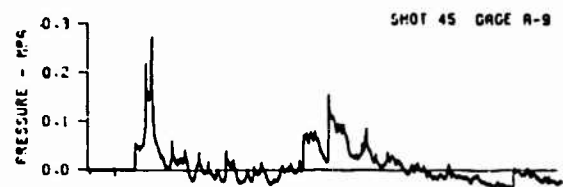
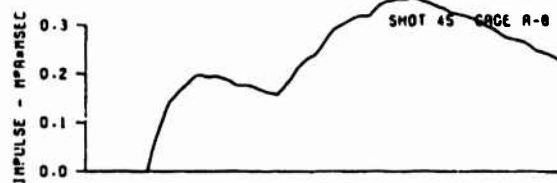
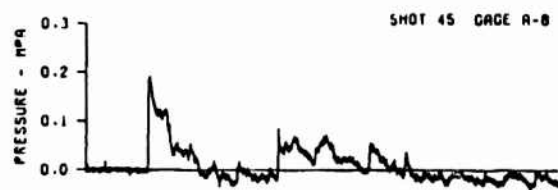
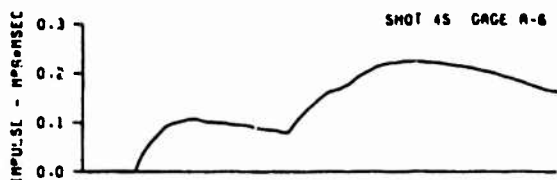
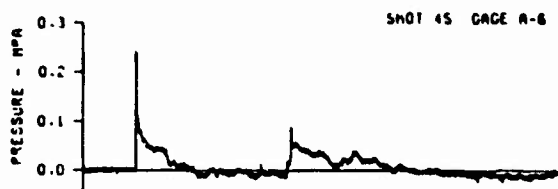
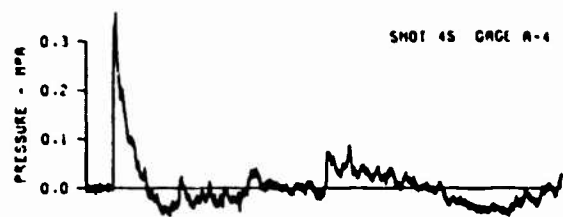


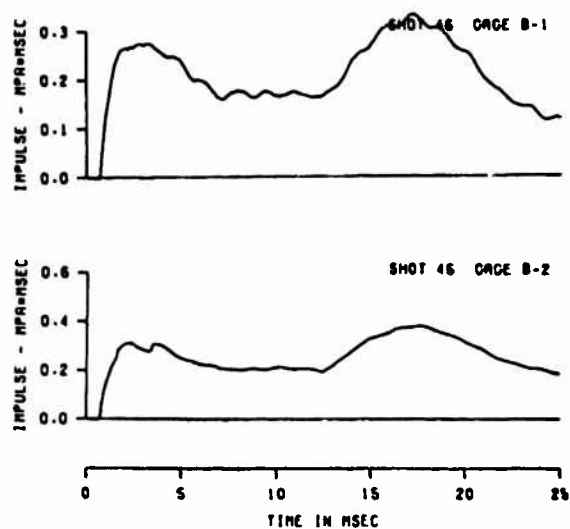
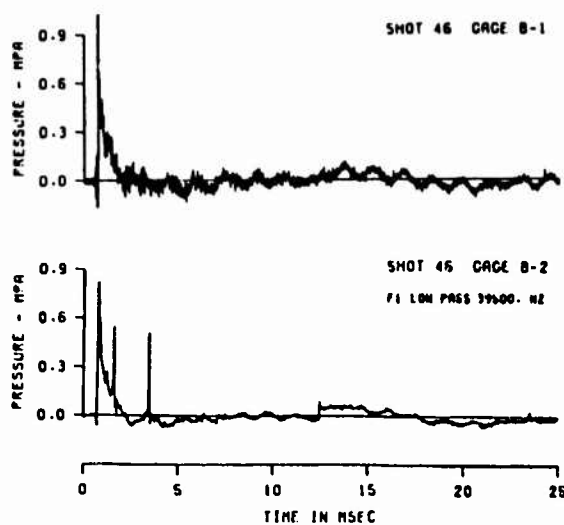
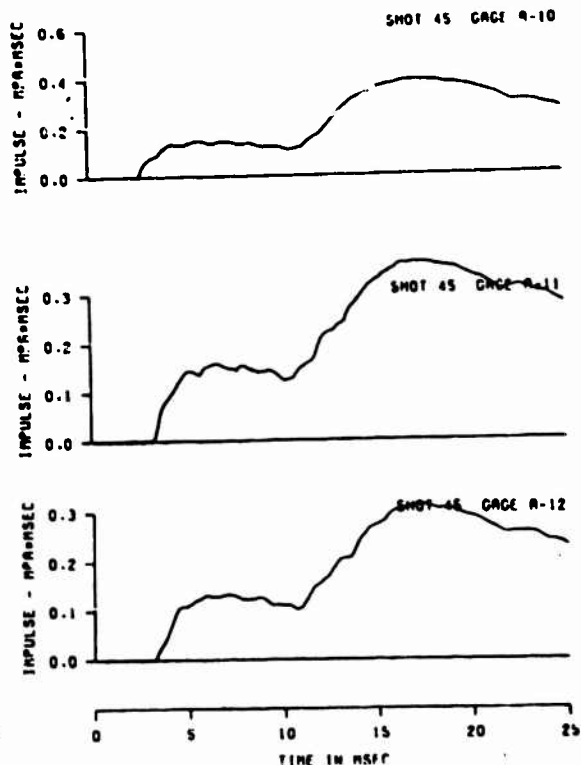
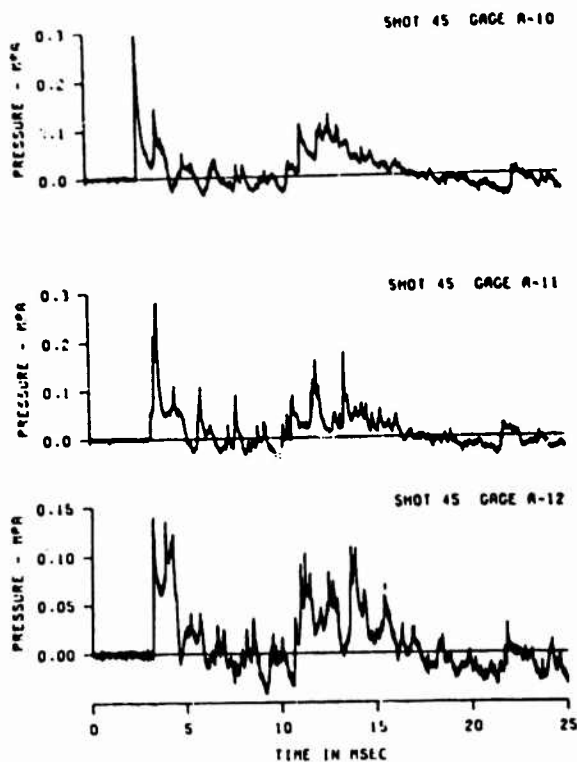


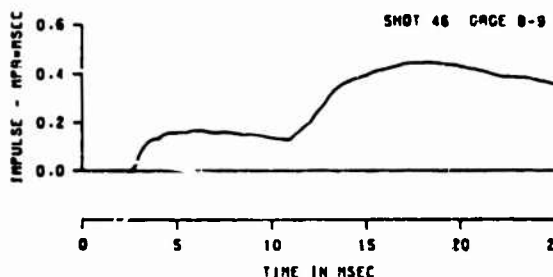
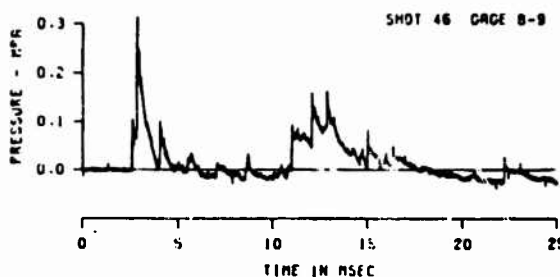
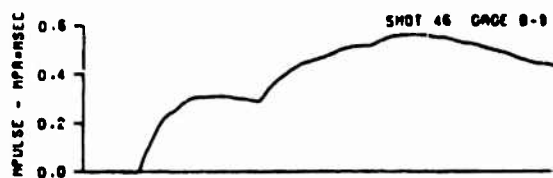
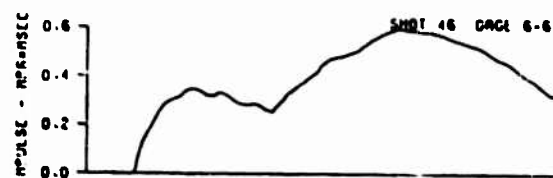
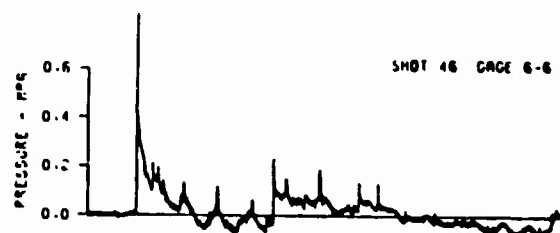
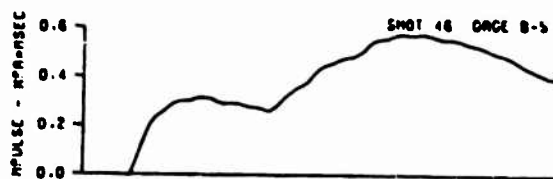
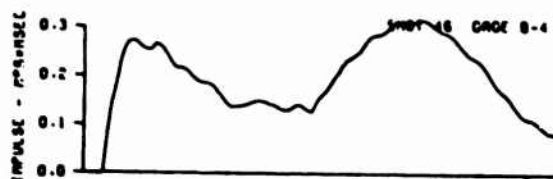
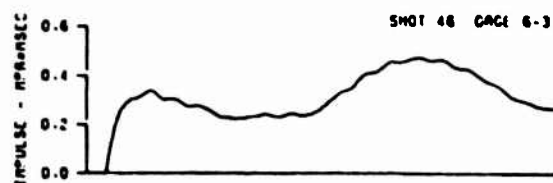


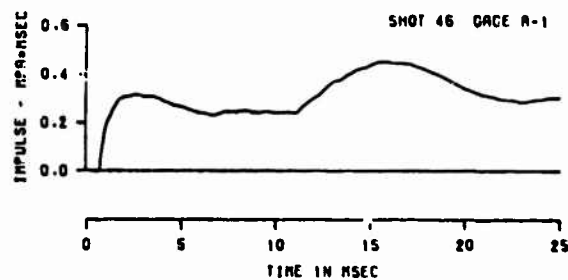
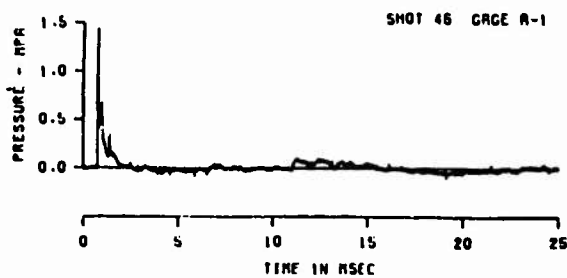
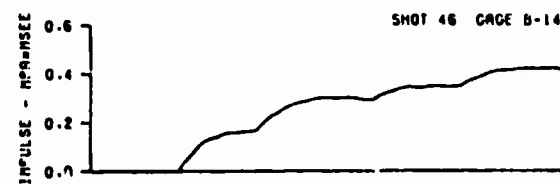
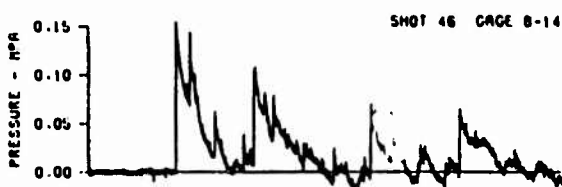
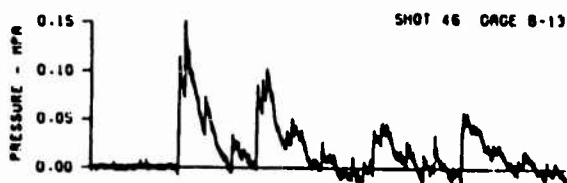
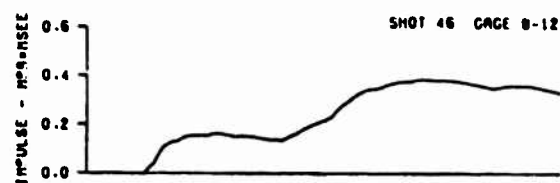
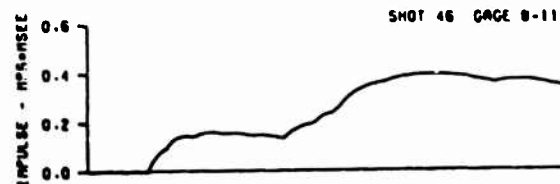
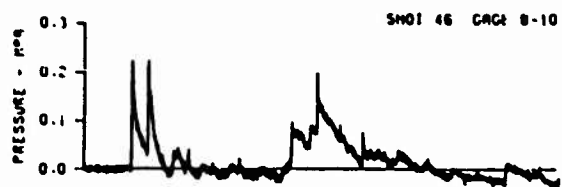


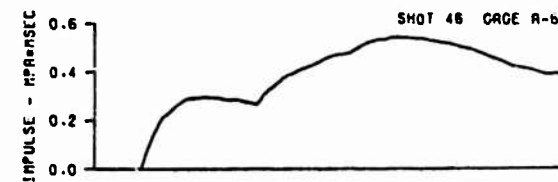
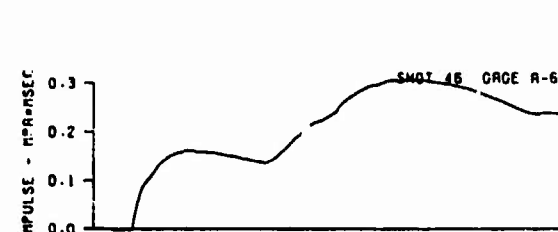
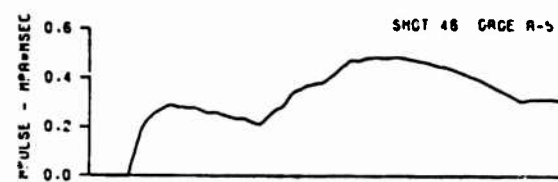
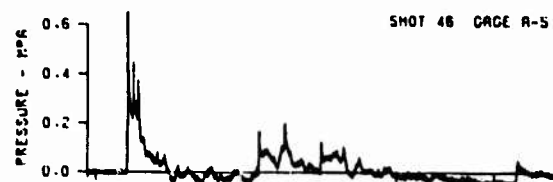
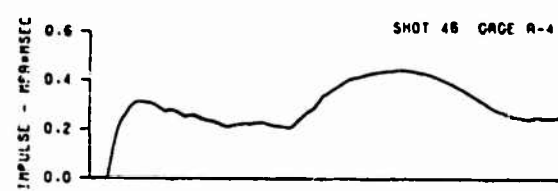
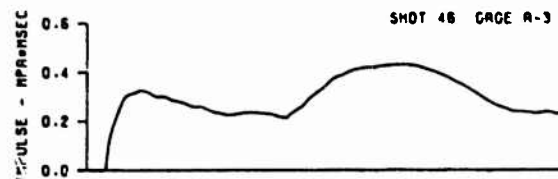
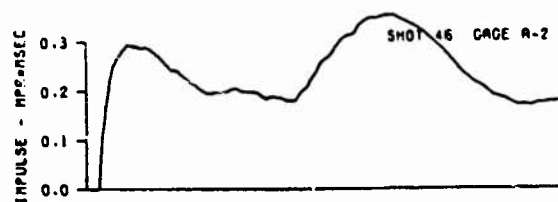






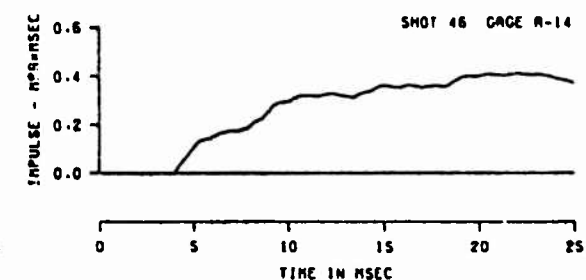
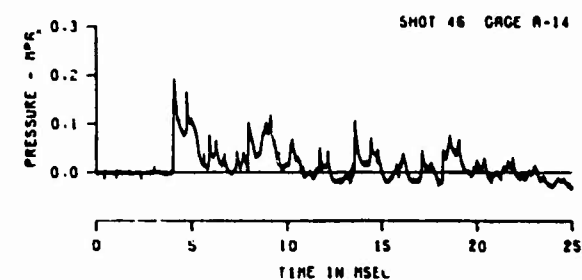
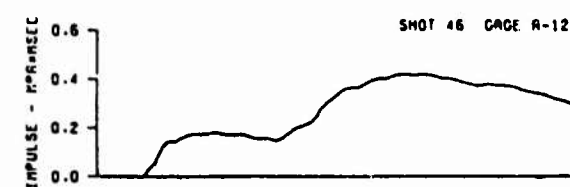
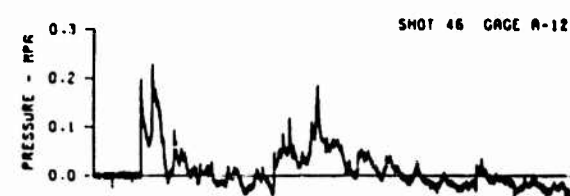
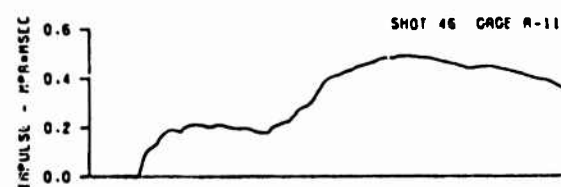
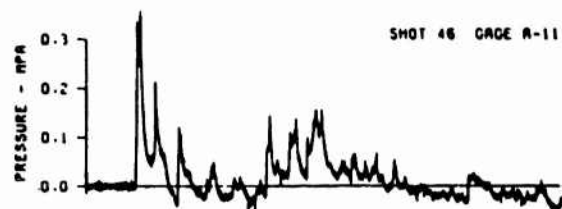
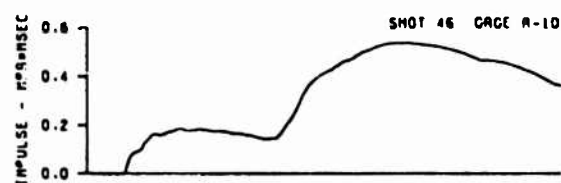
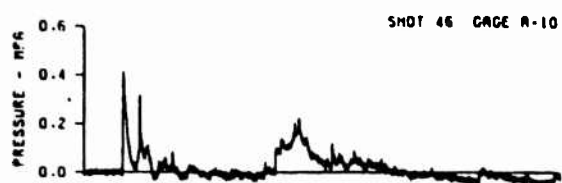
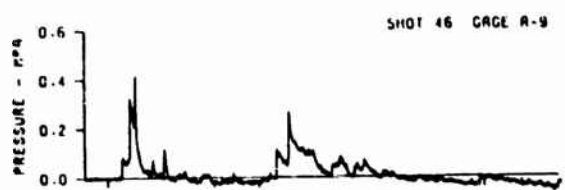


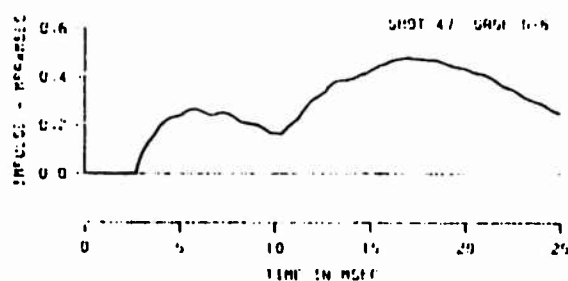
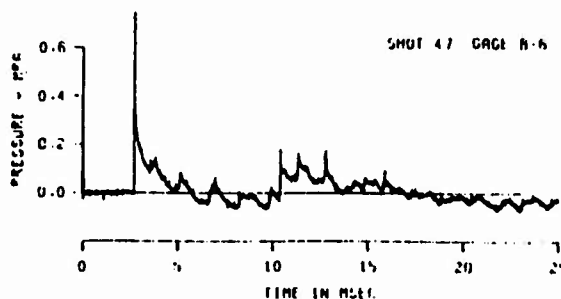
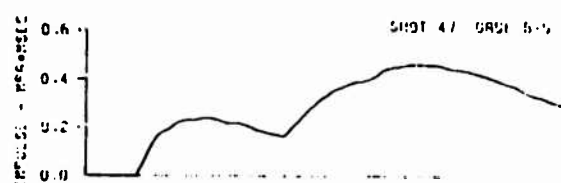
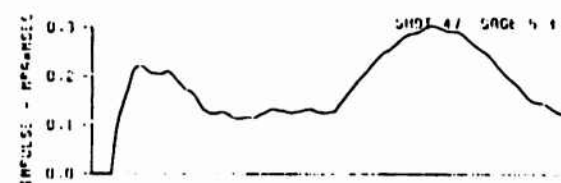
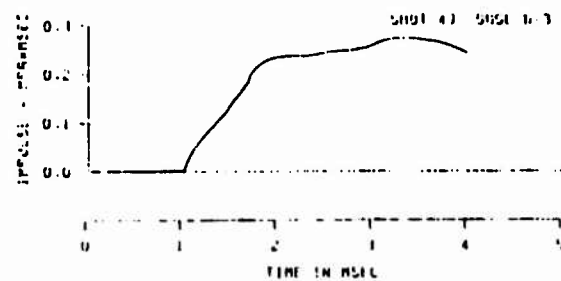
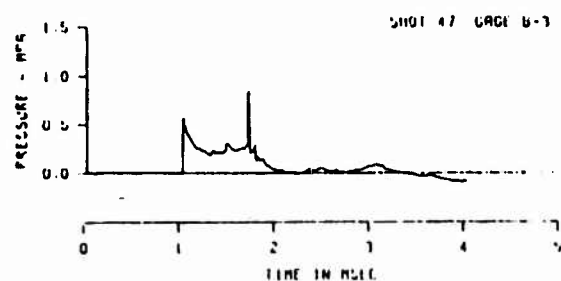
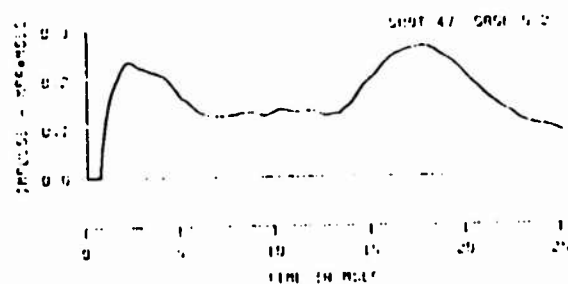
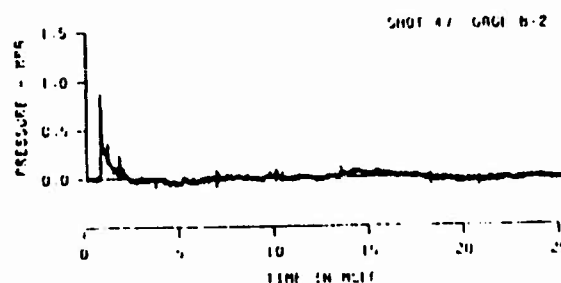
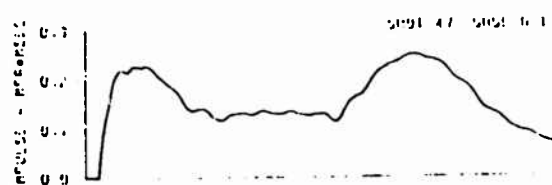


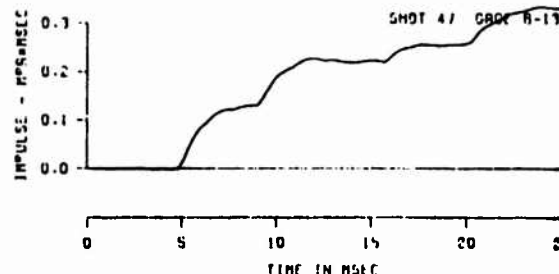
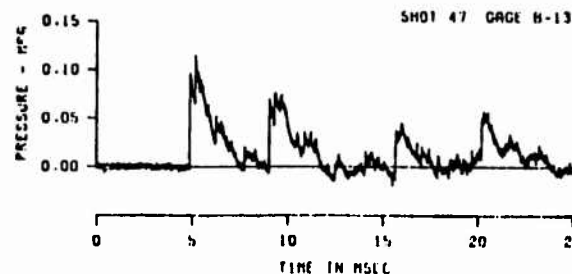
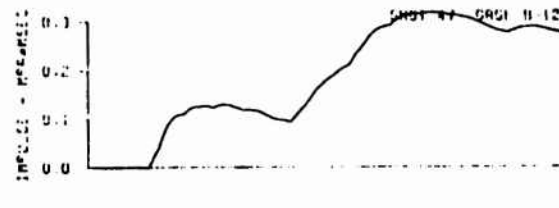
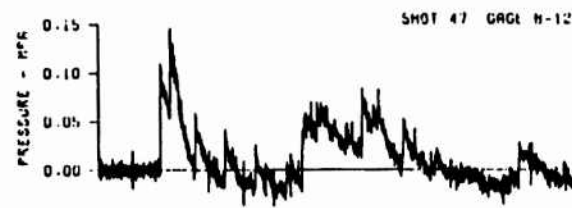
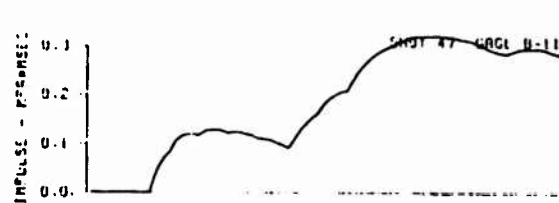
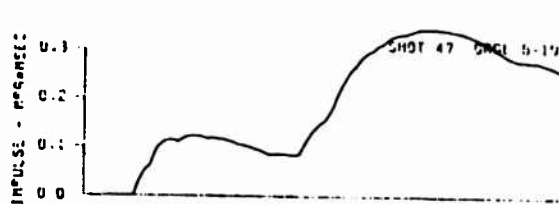
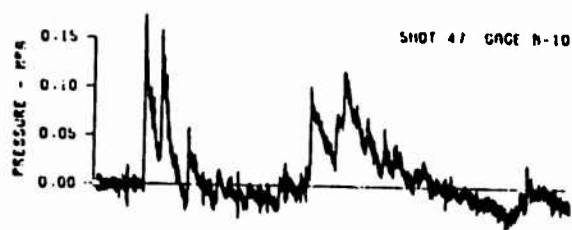
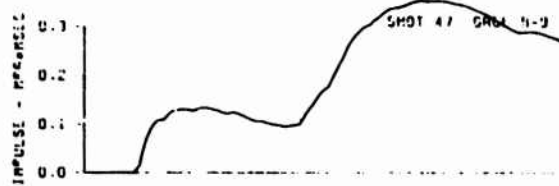
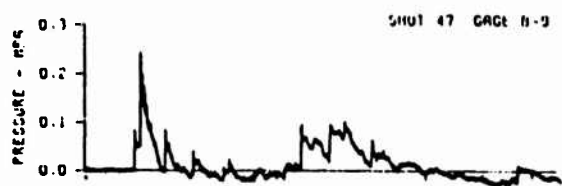
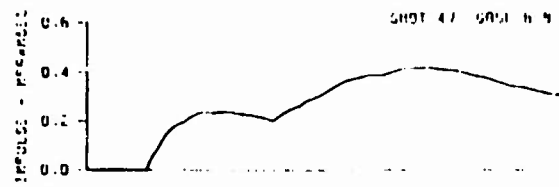


TIME IN MSEC

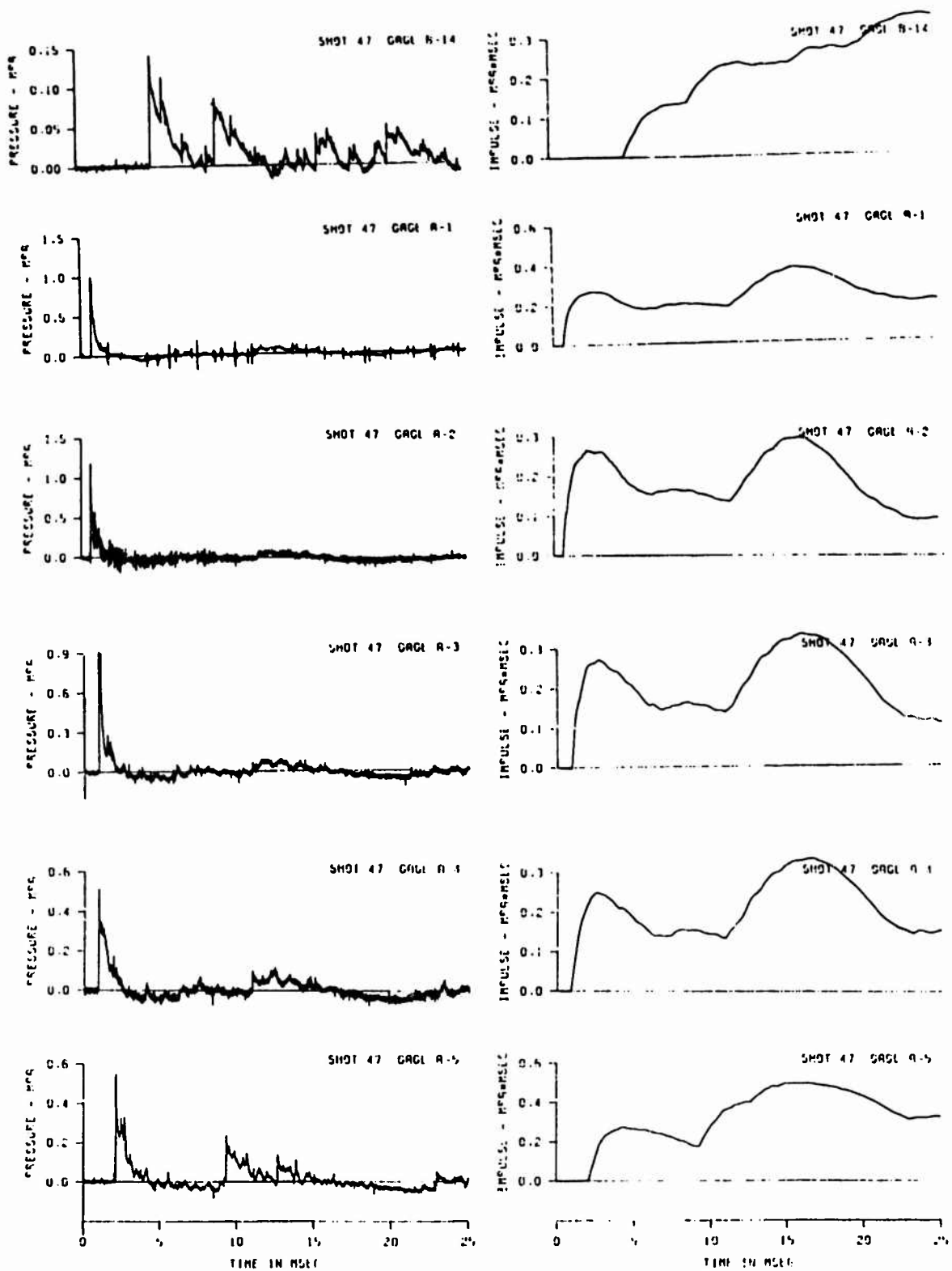
TIME IN MSEC

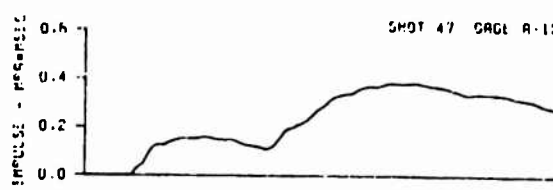
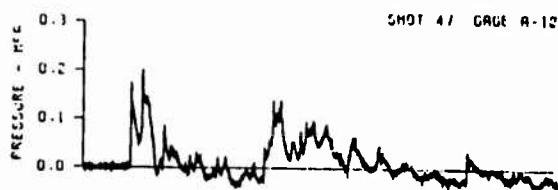
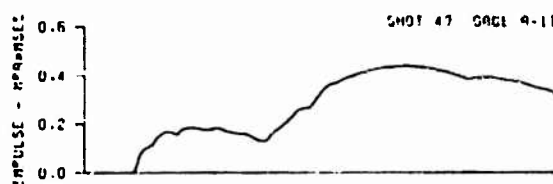
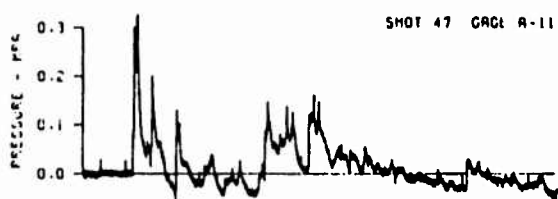
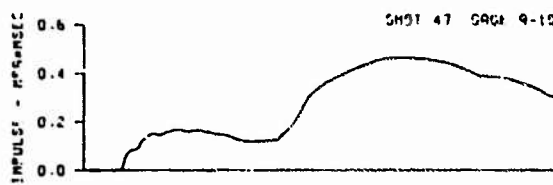
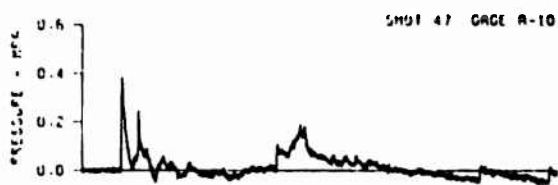
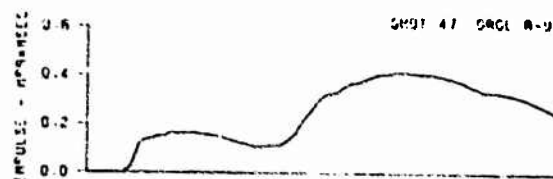
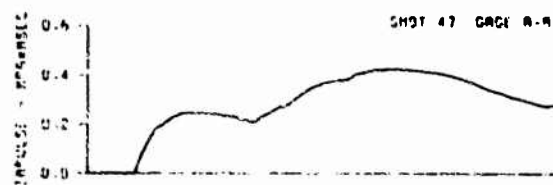
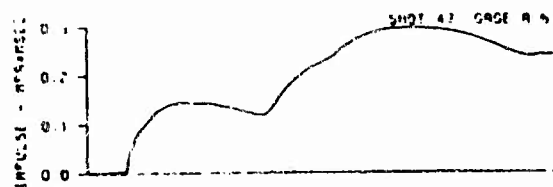






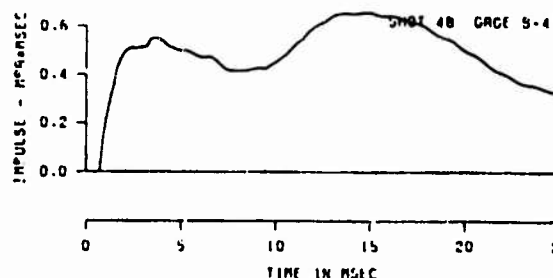
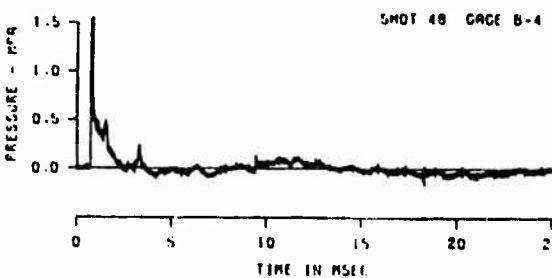
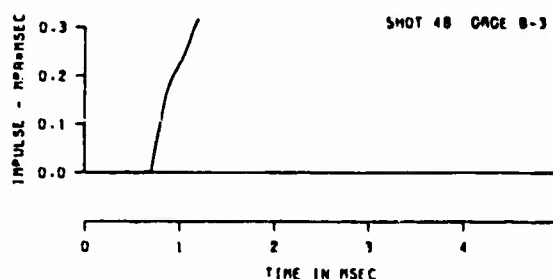
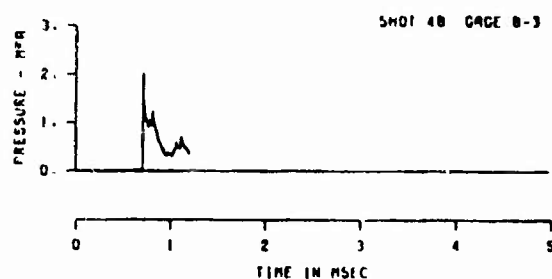
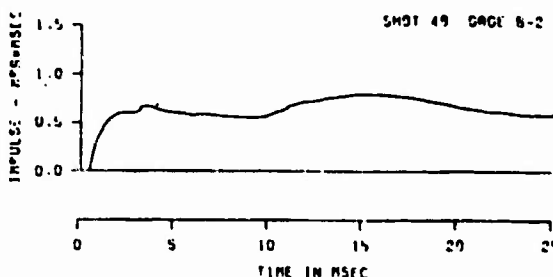
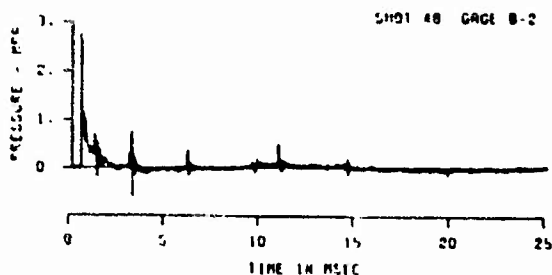
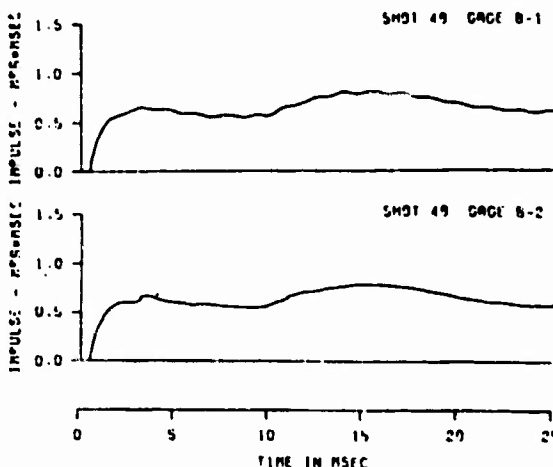
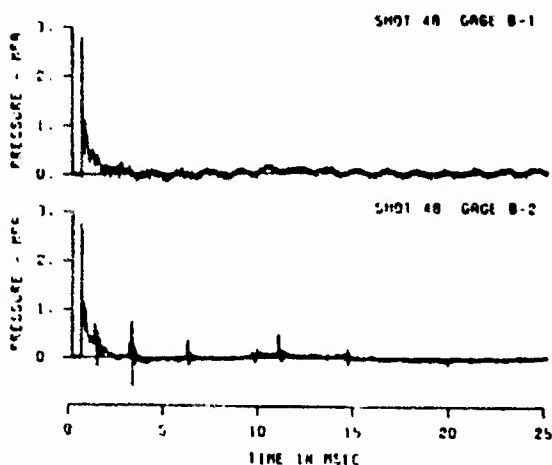
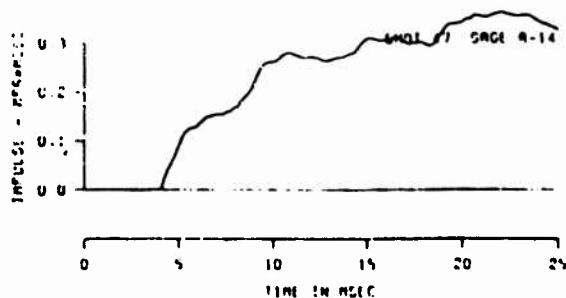
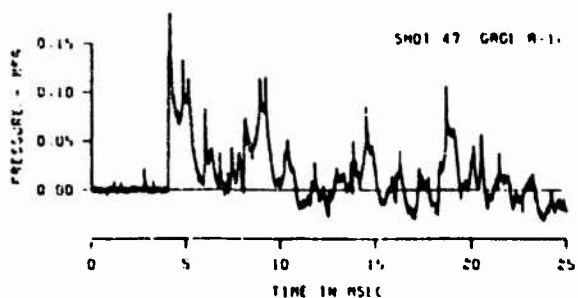


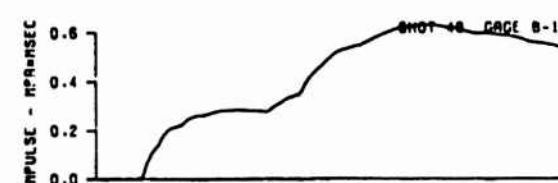
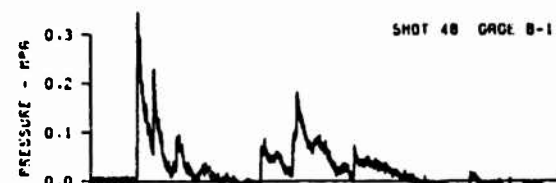
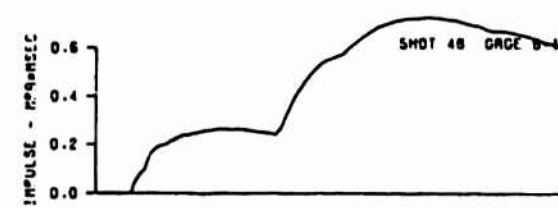
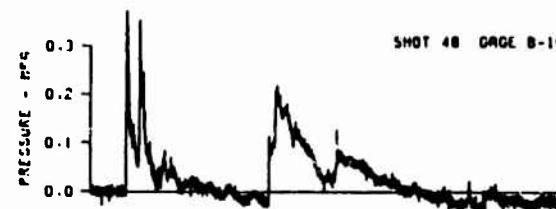
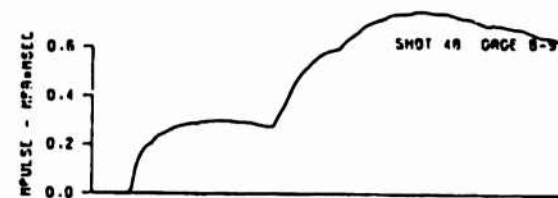
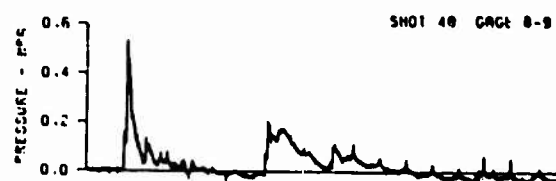
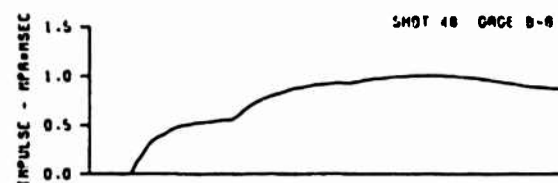
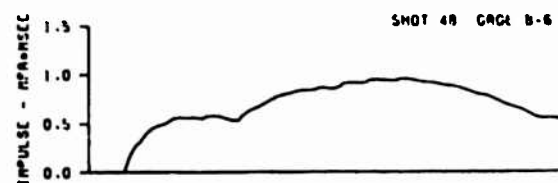
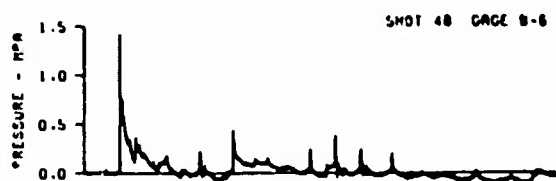
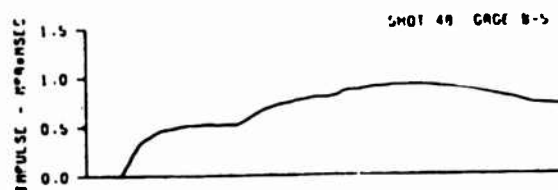
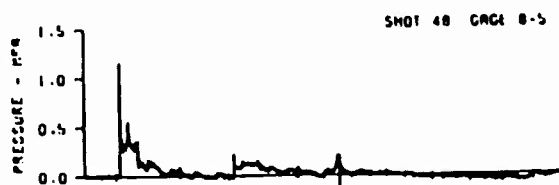


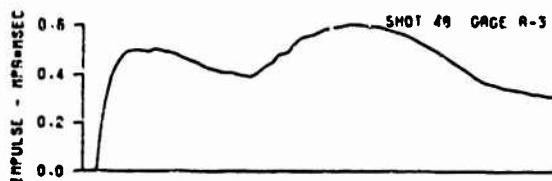
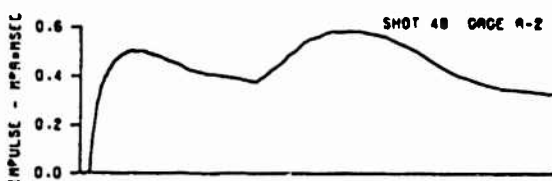
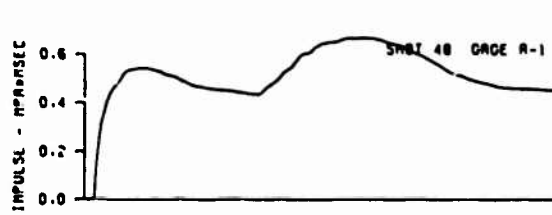
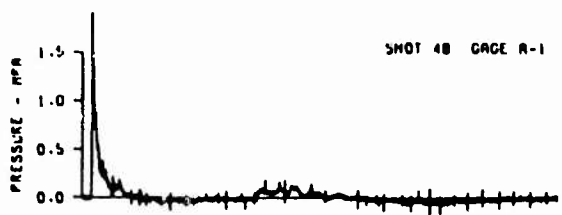
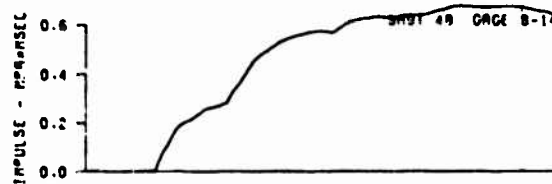
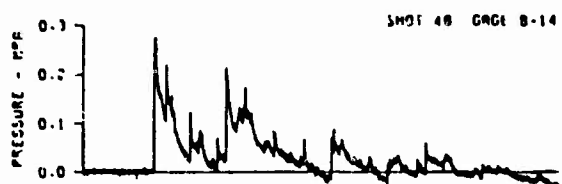
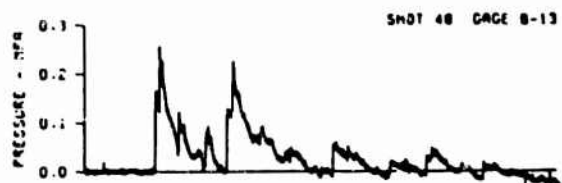


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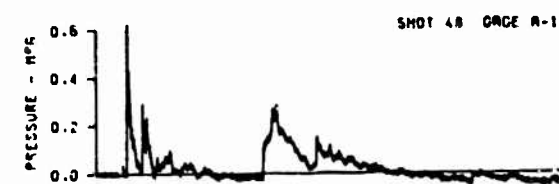
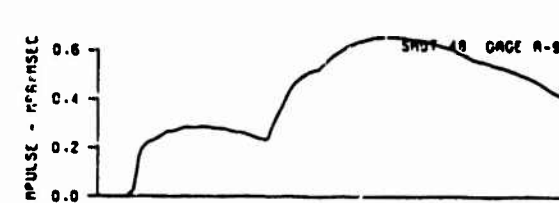
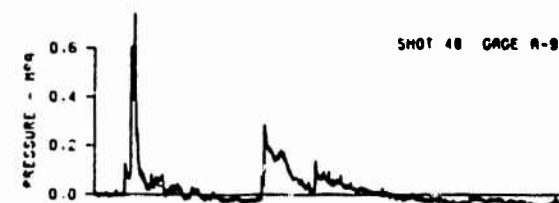
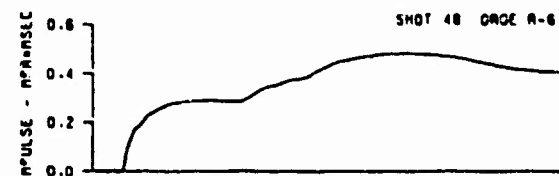
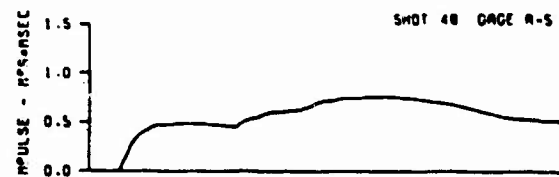
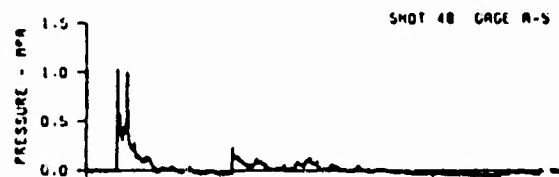
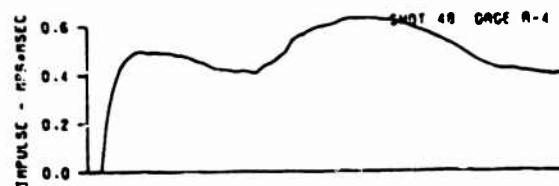


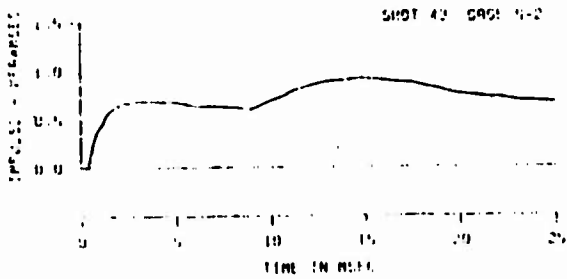
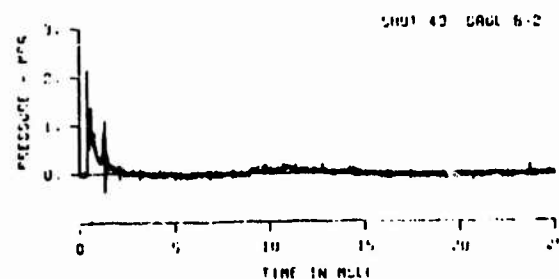
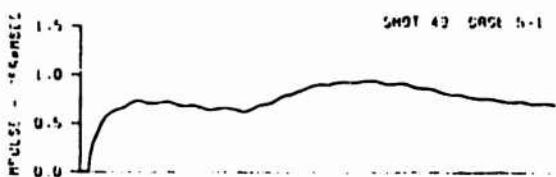
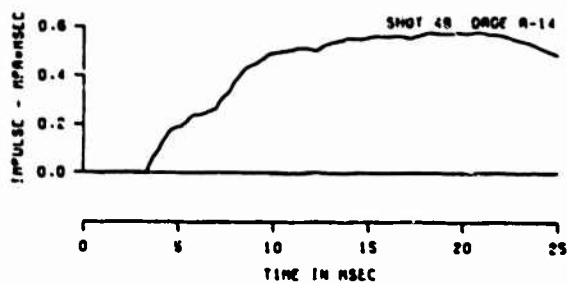
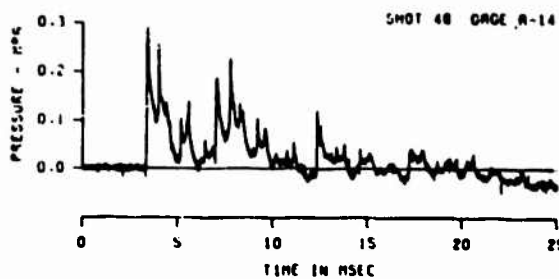
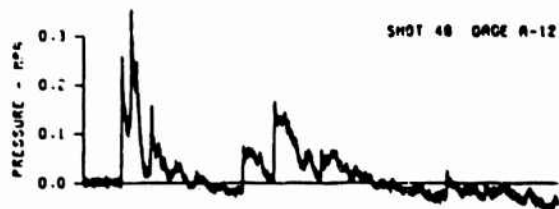
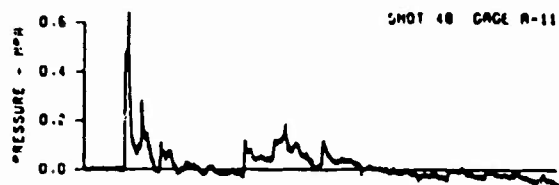


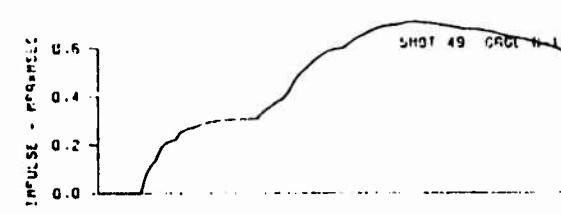
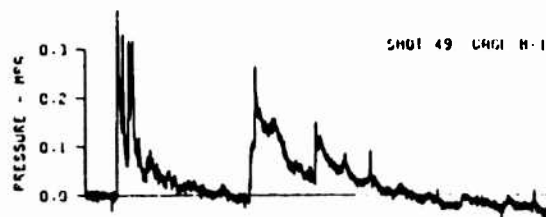
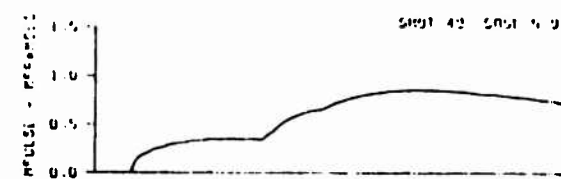
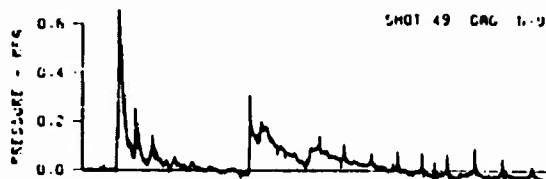
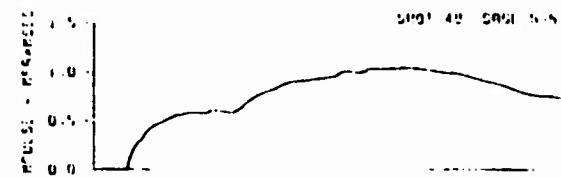
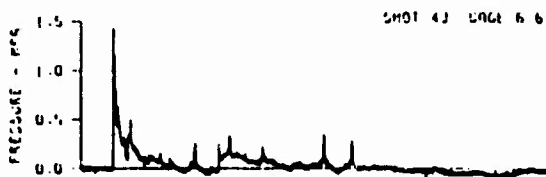
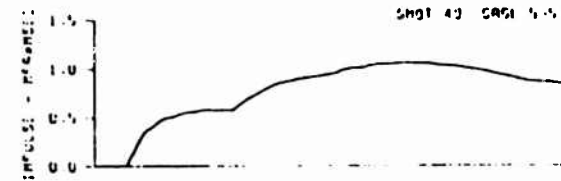
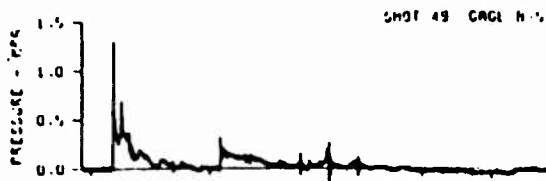
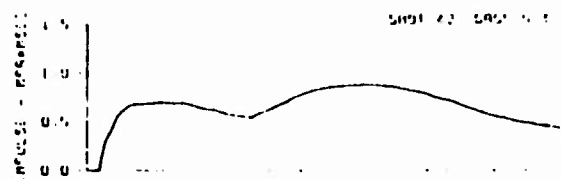


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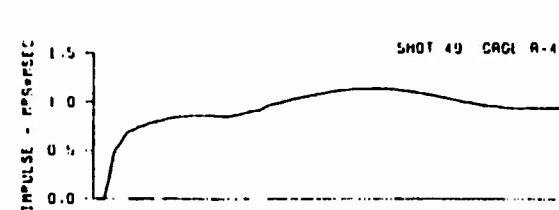
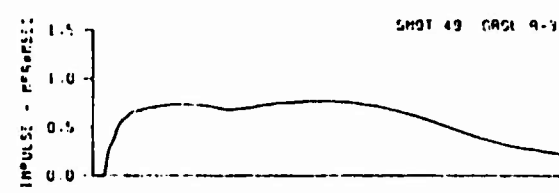
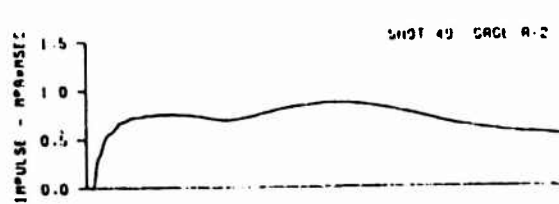
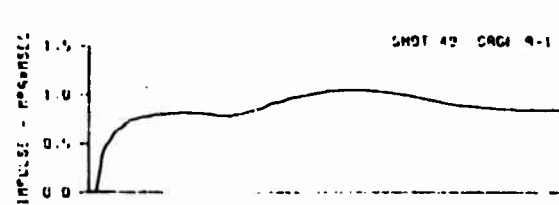
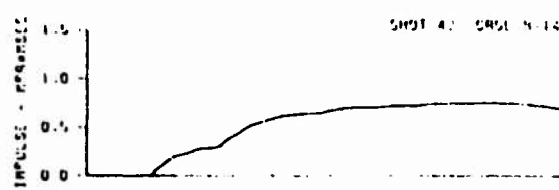
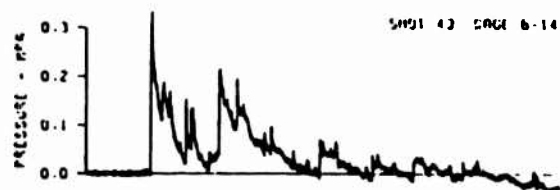
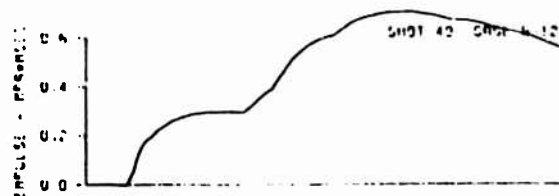
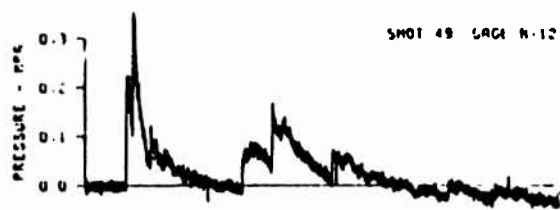




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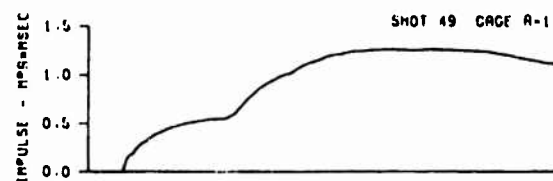
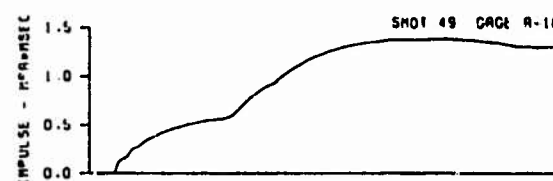
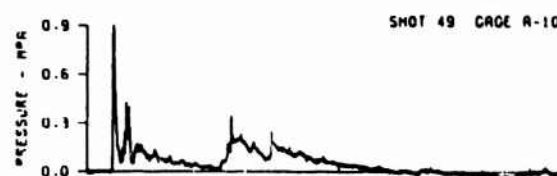
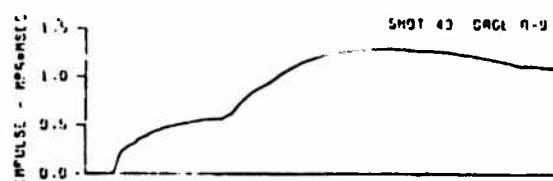
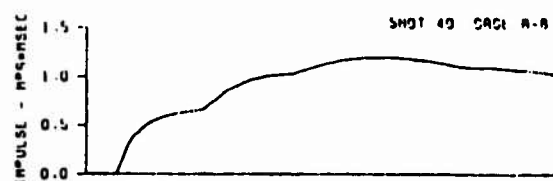
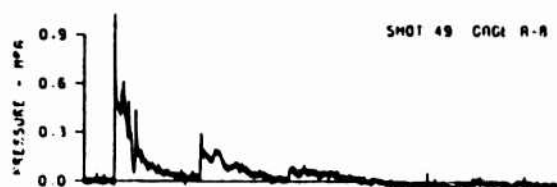
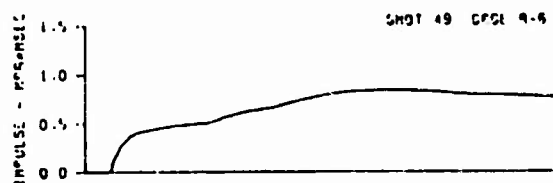
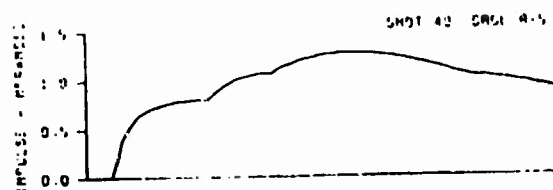
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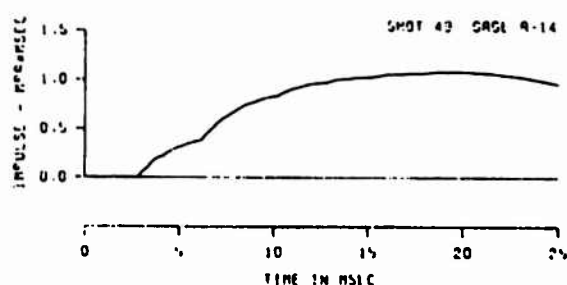
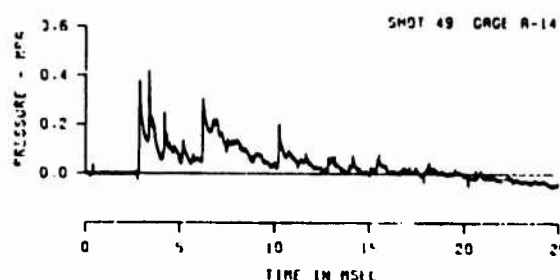
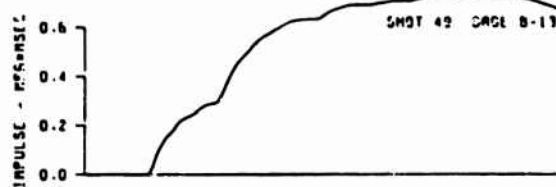
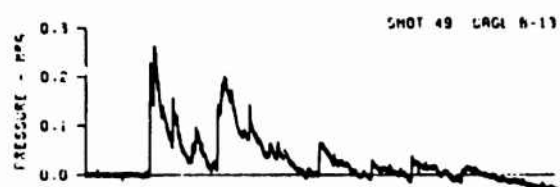
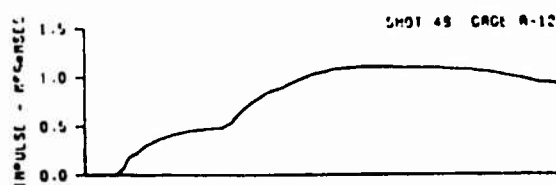
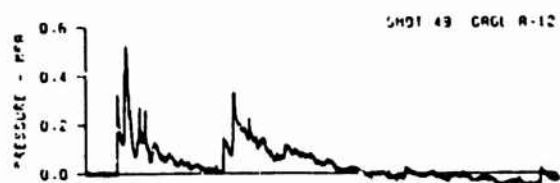
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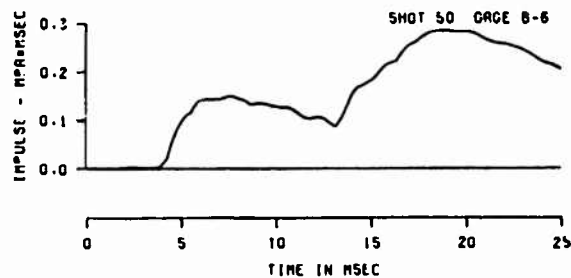
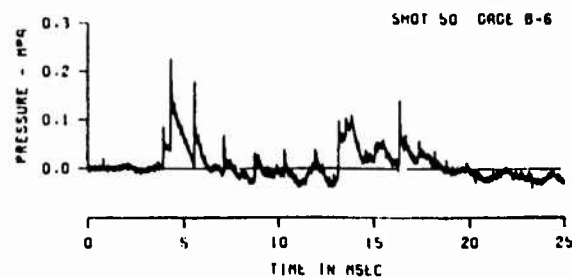
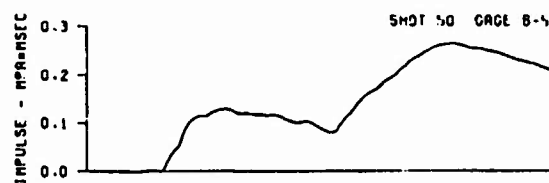
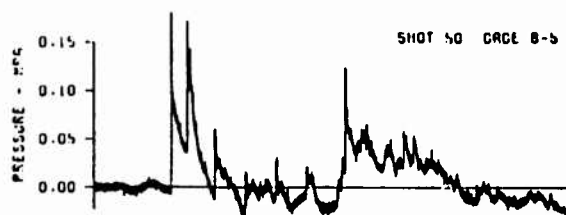
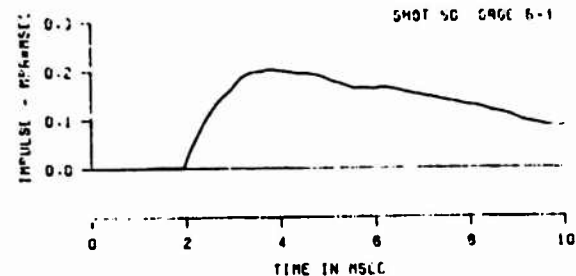
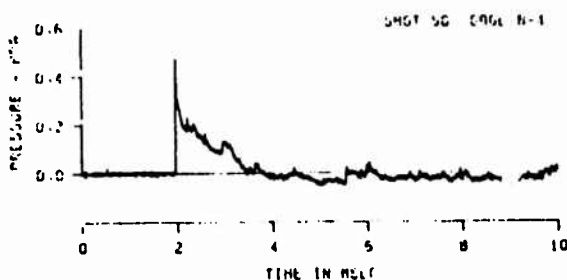
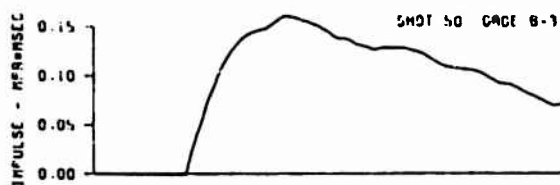
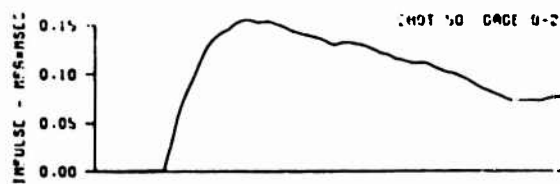
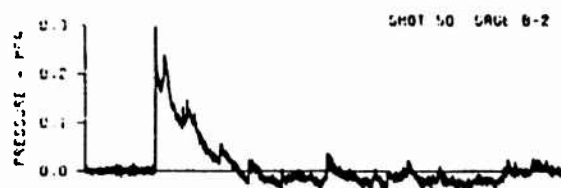
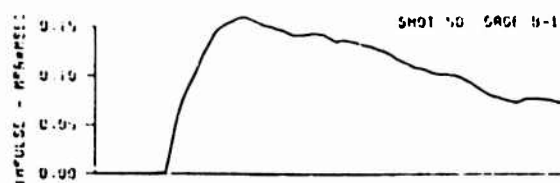
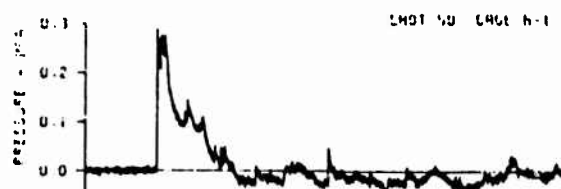
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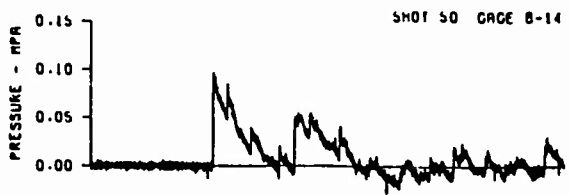
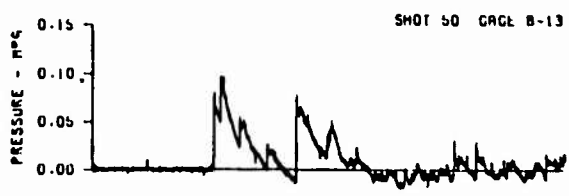
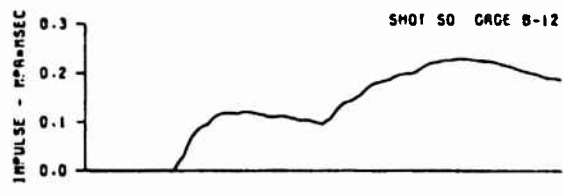
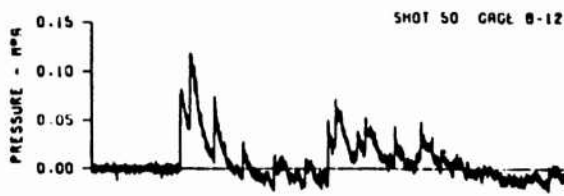
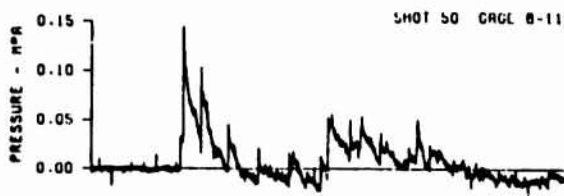
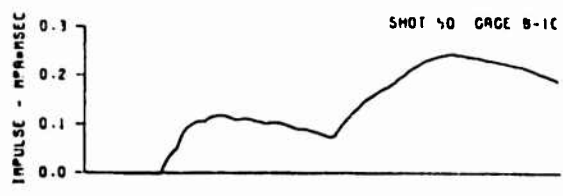
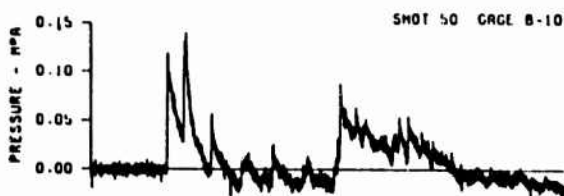
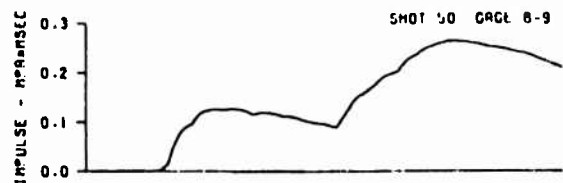


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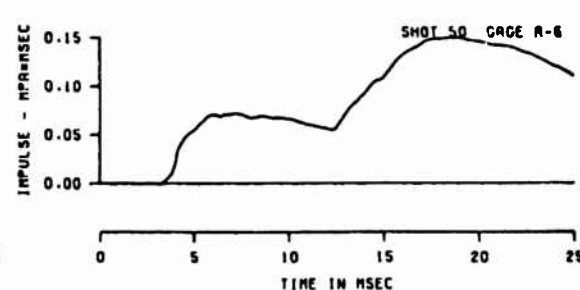
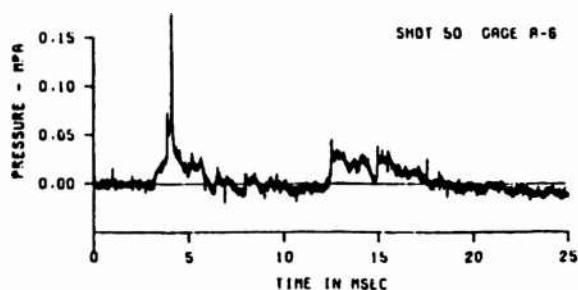
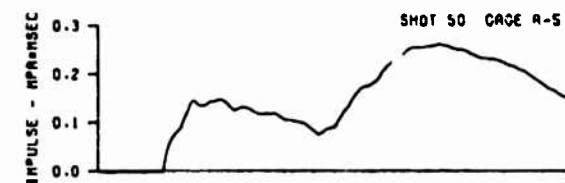
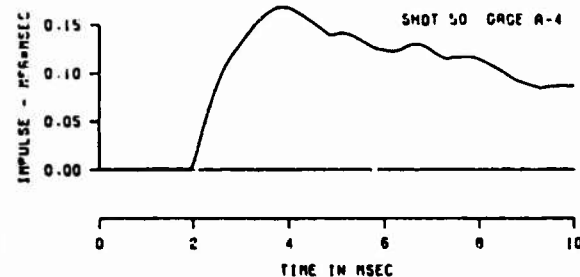
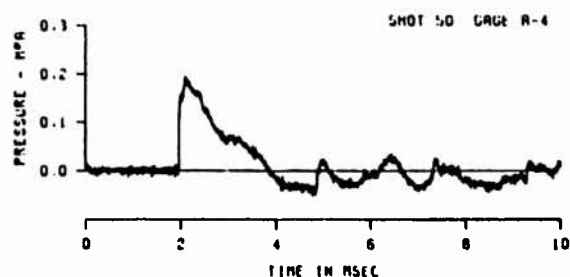
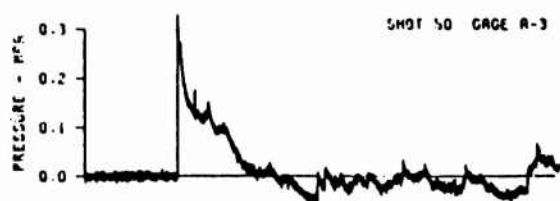
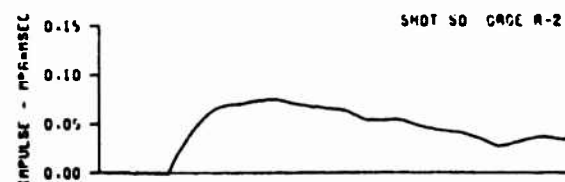
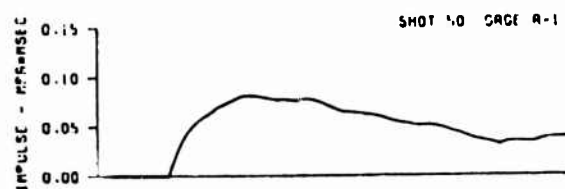


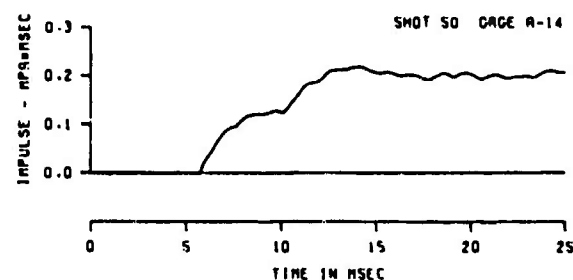
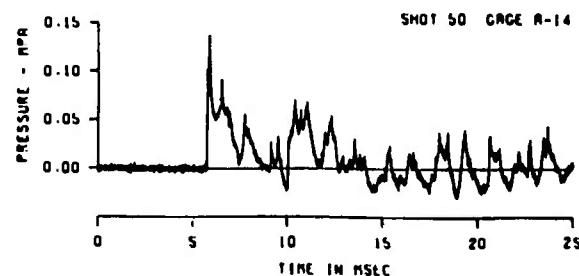
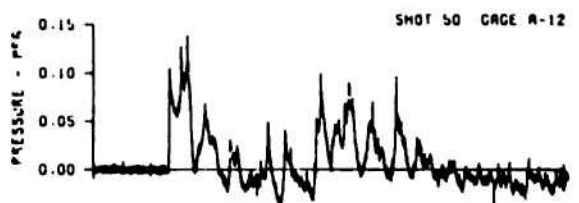
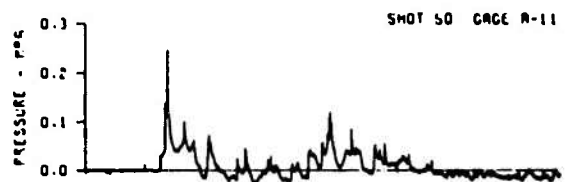
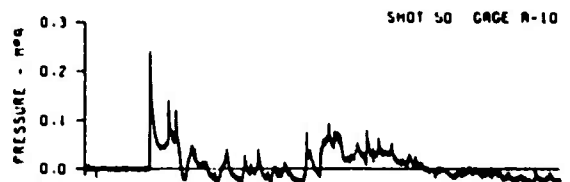
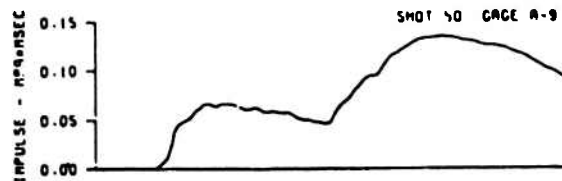
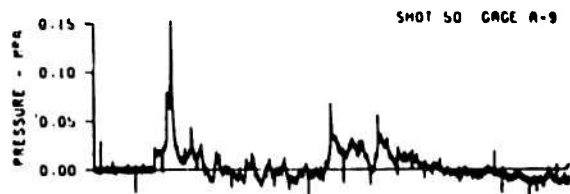


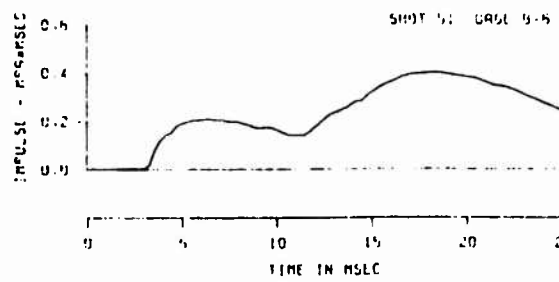
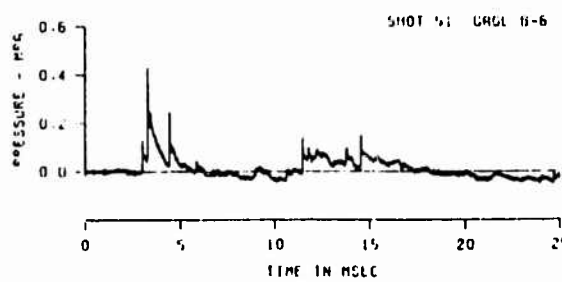
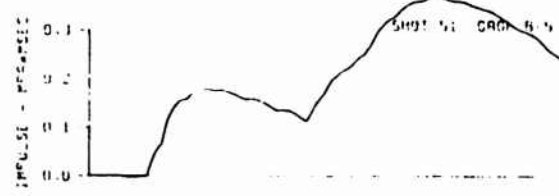
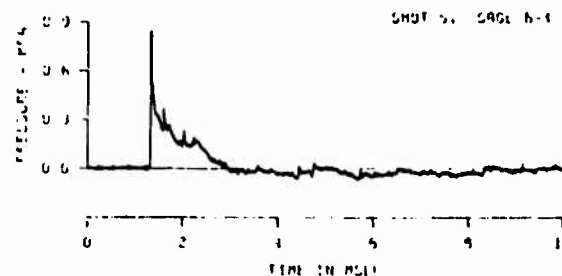
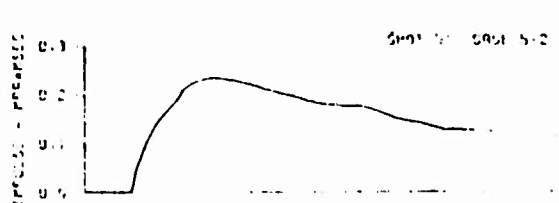
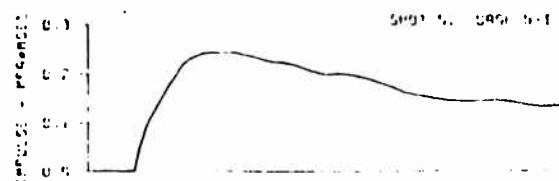


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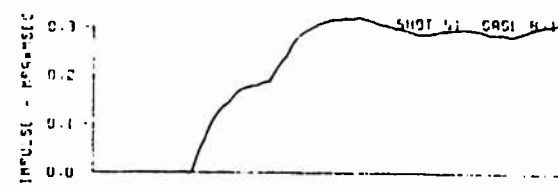
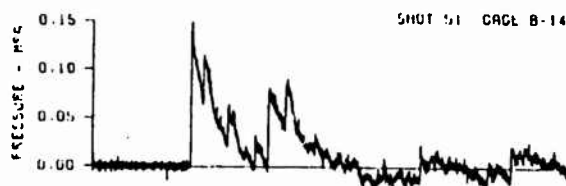
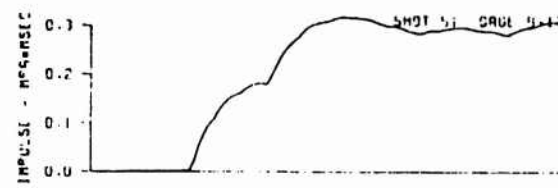
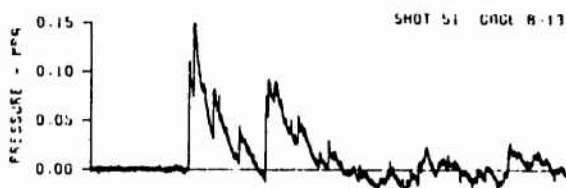
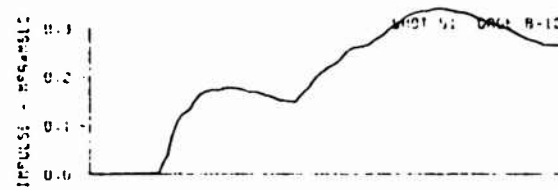
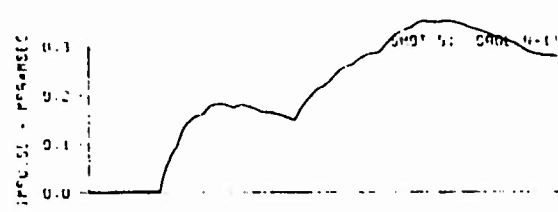
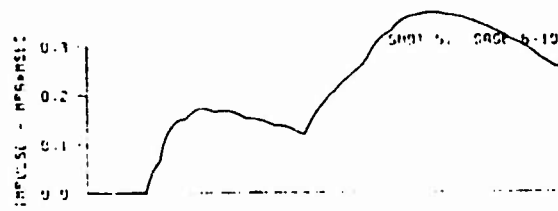
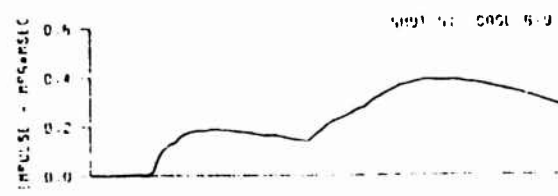
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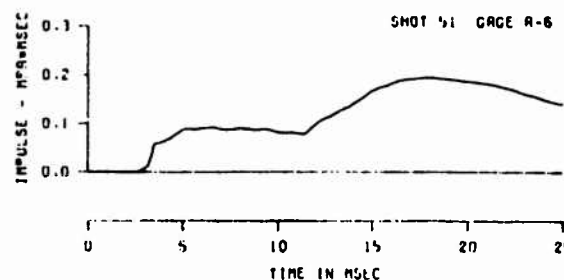
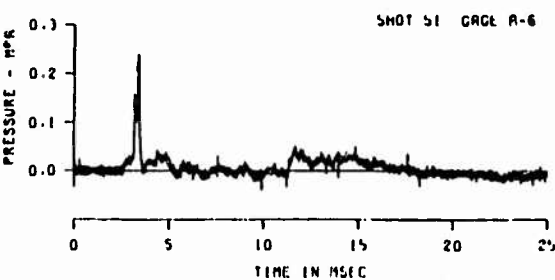
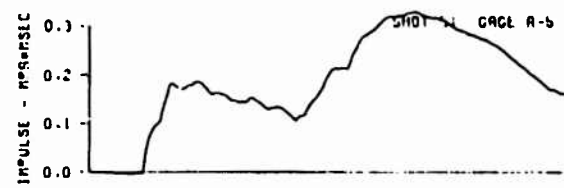
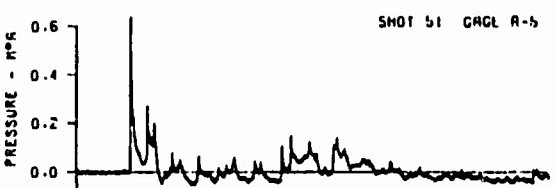
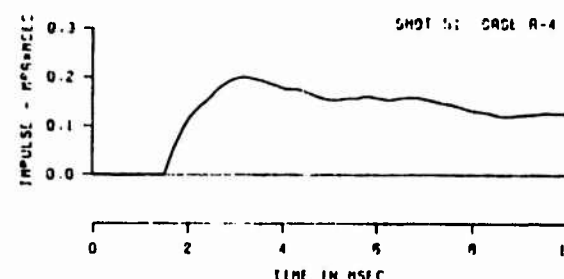
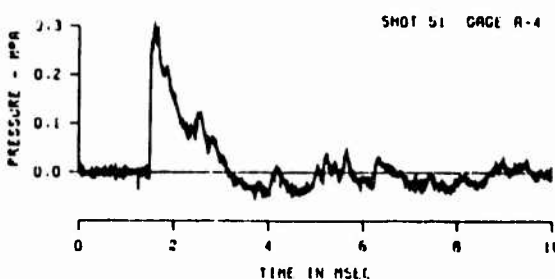
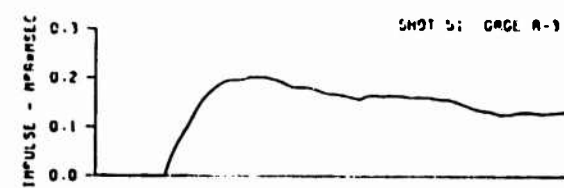
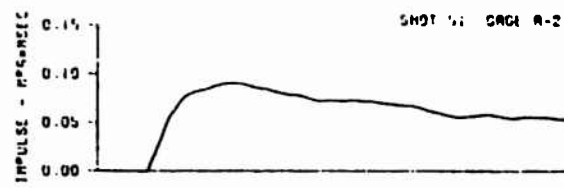
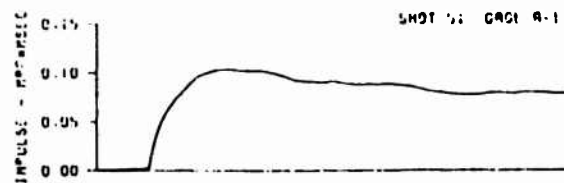


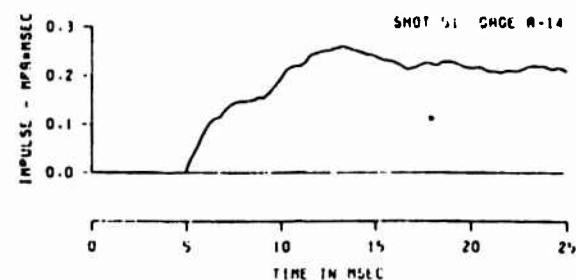
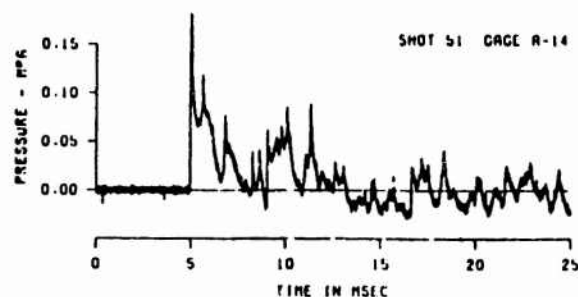
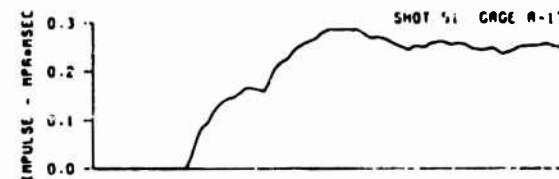
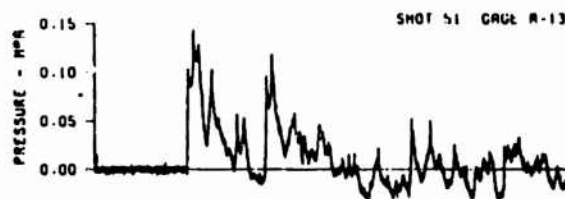
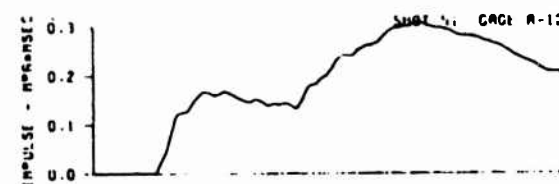
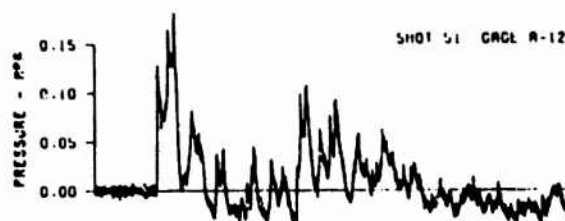
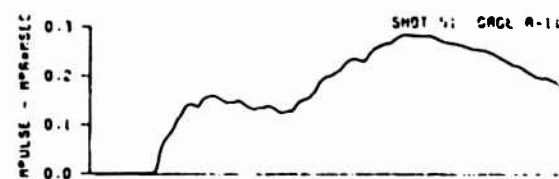
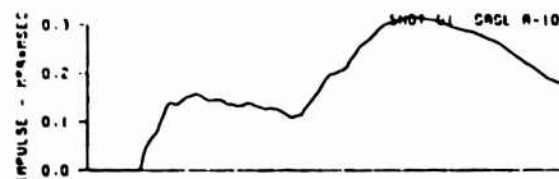
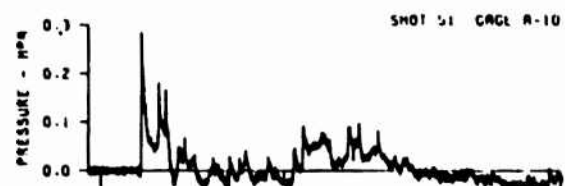
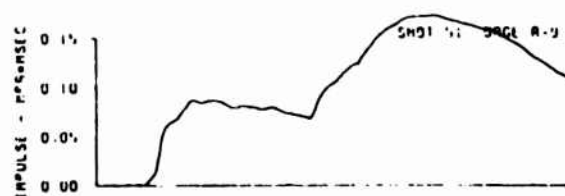


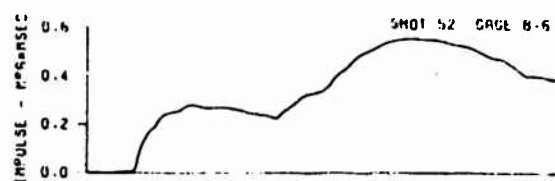
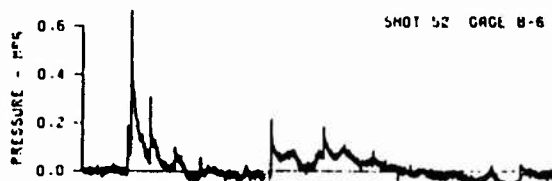
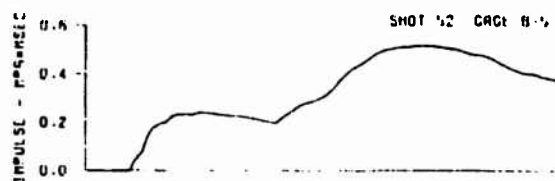
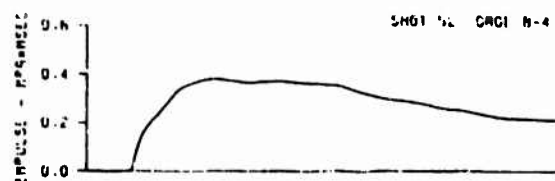
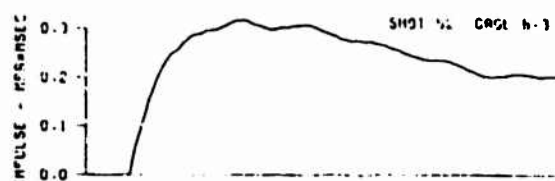
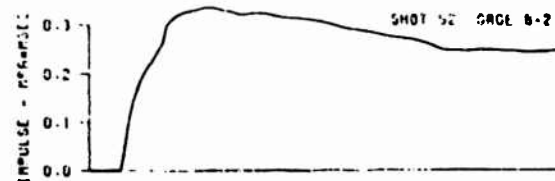
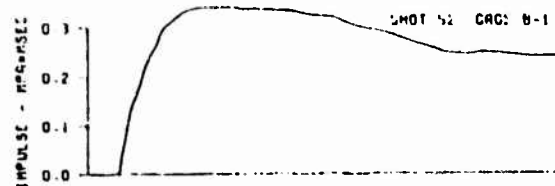
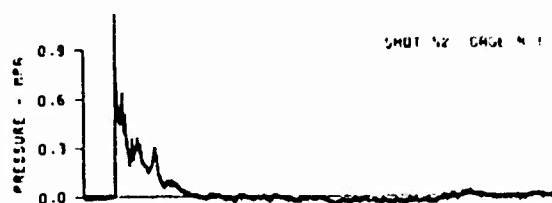


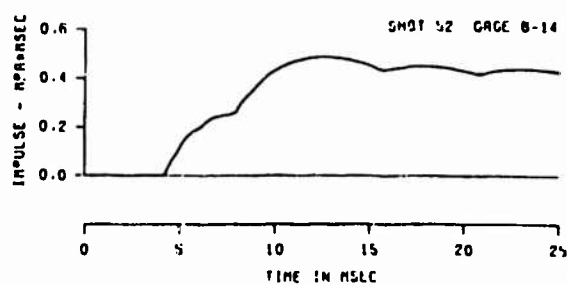
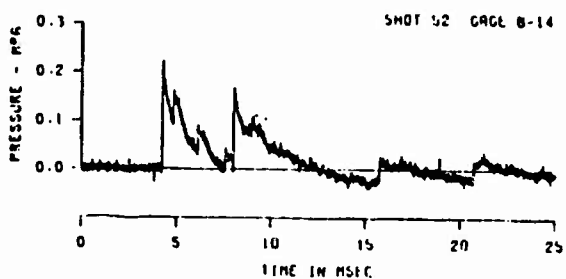
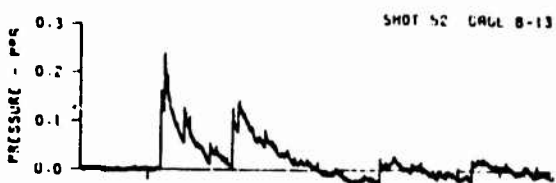
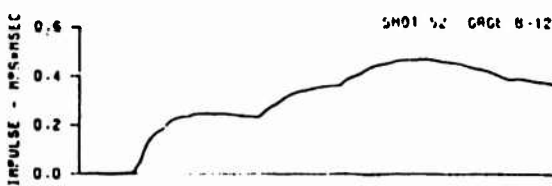
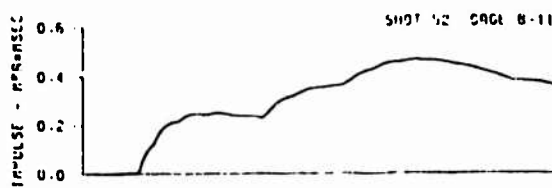
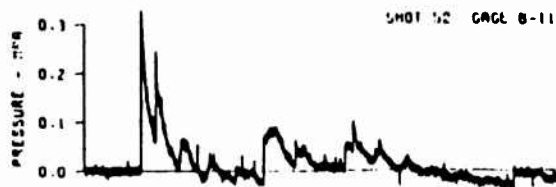
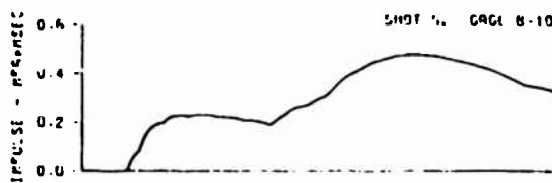
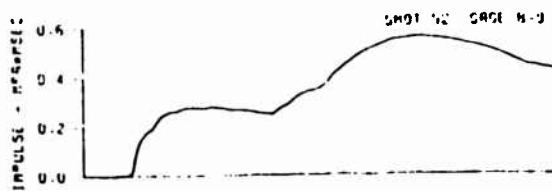
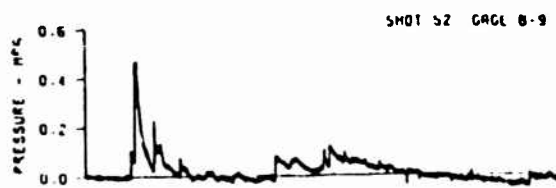


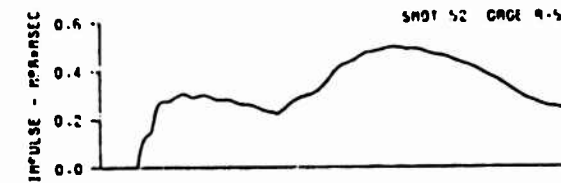
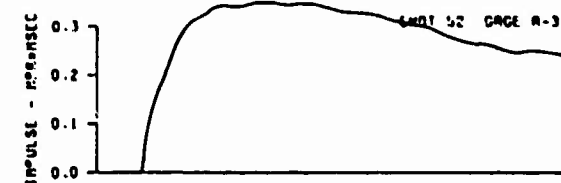
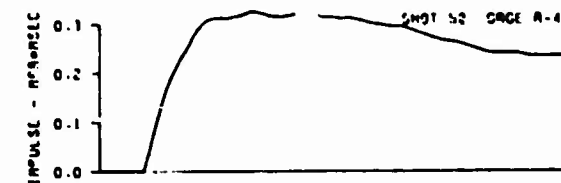
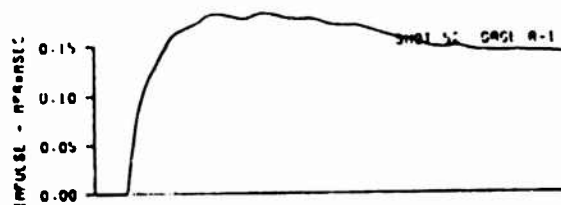


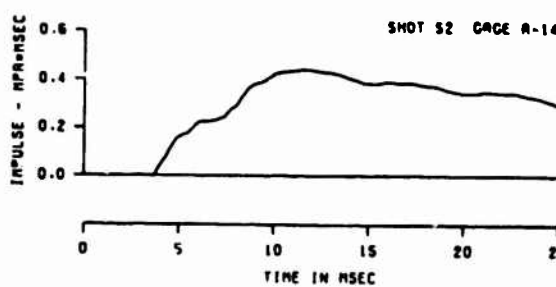
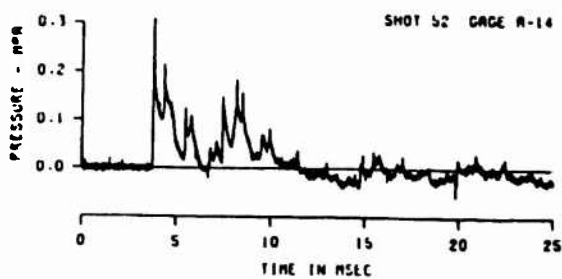
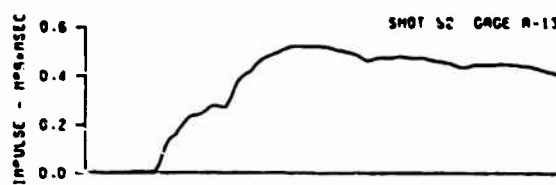
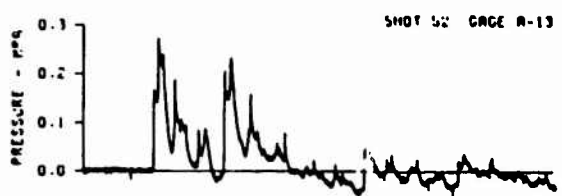
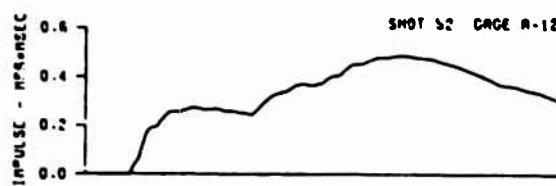
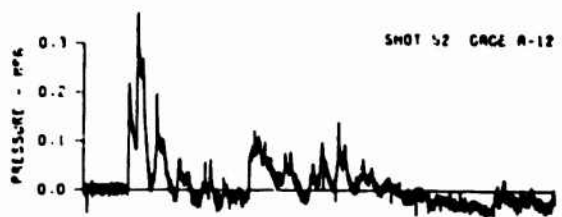
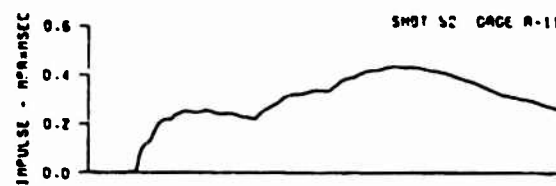
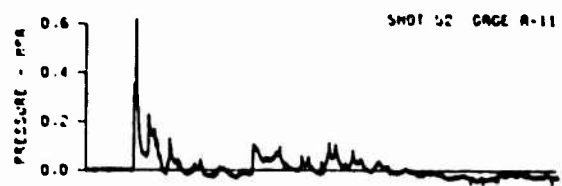
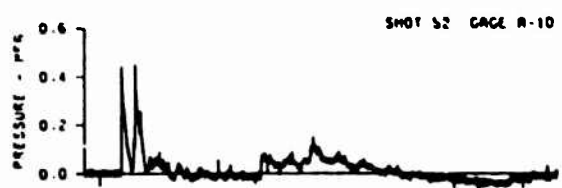
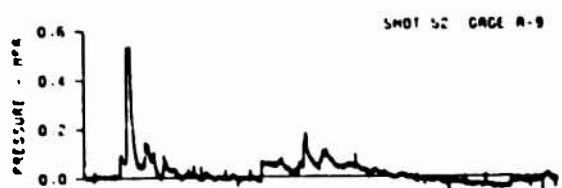


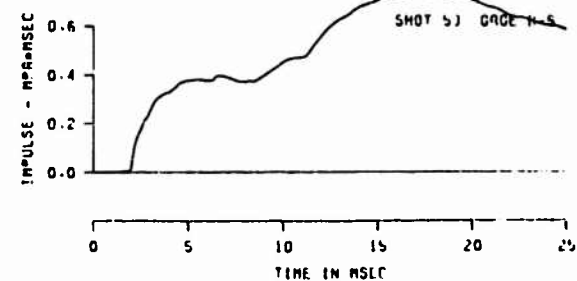
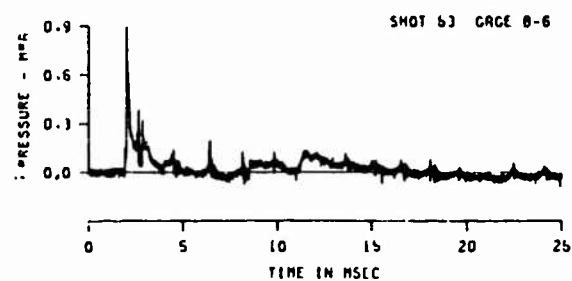
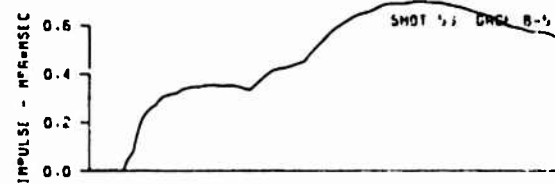
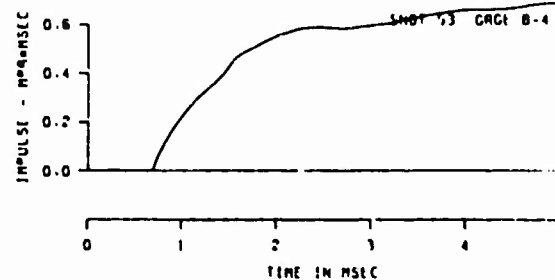
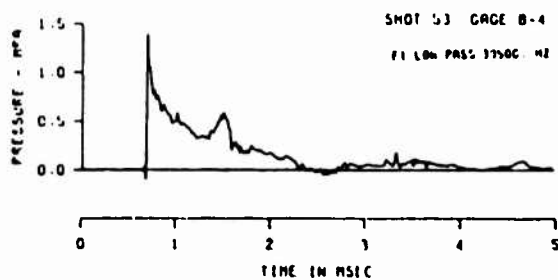
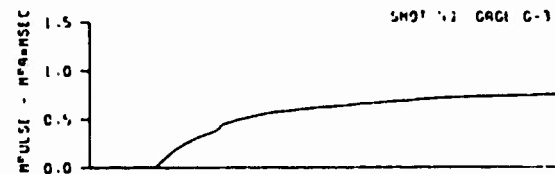
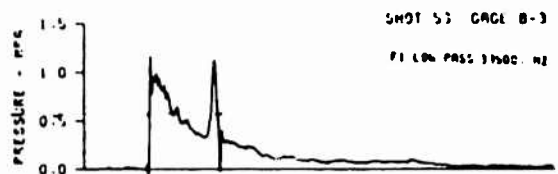
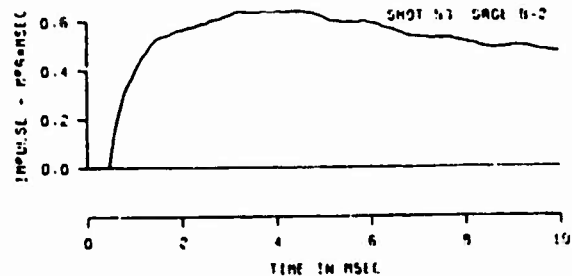
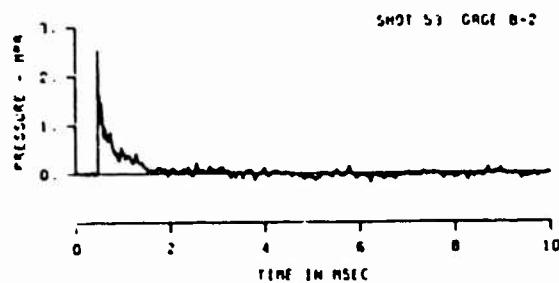
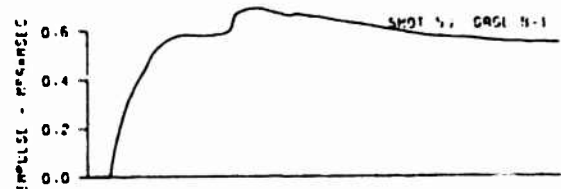




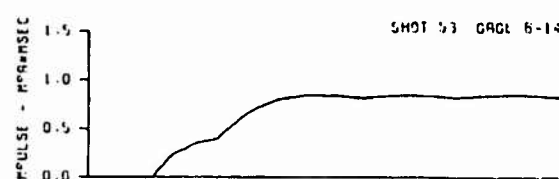
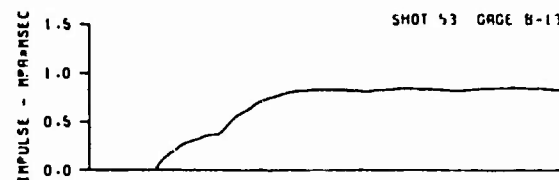
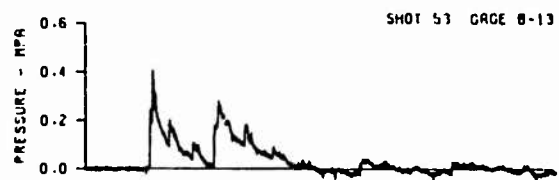
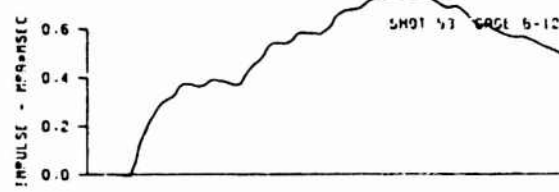
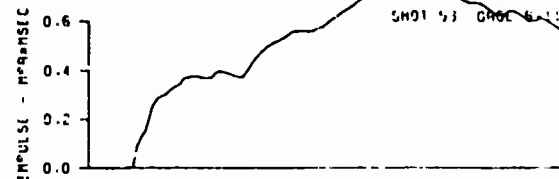
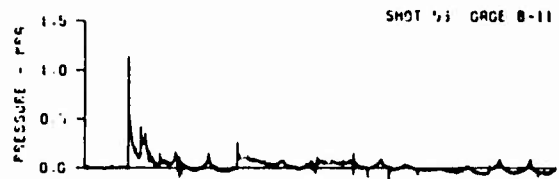
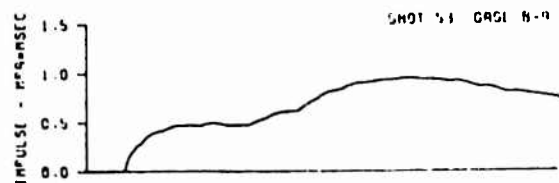
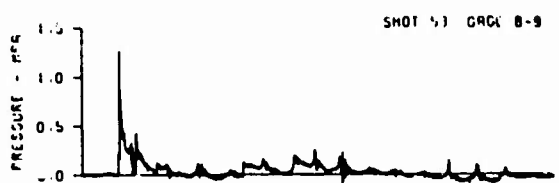


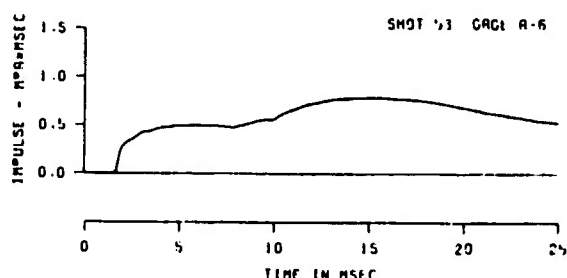
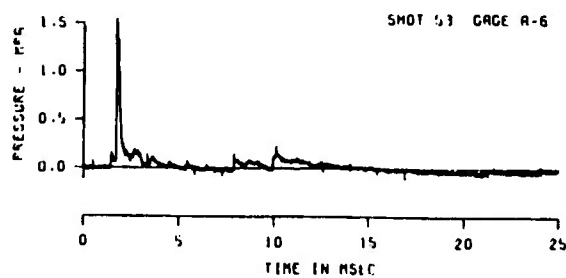
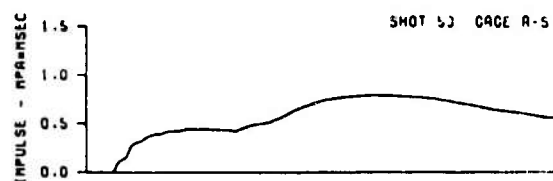
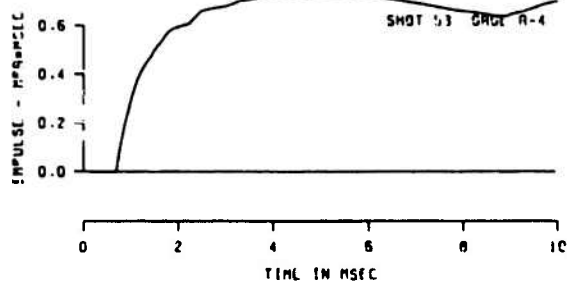
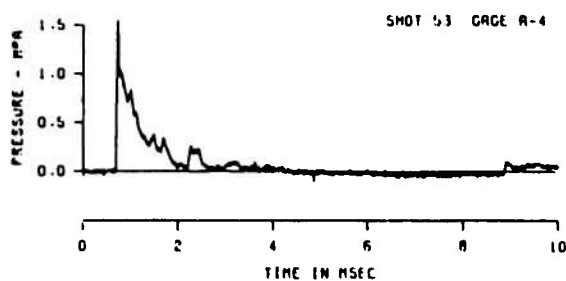
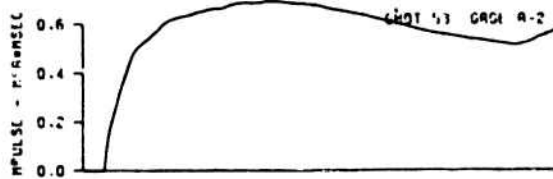
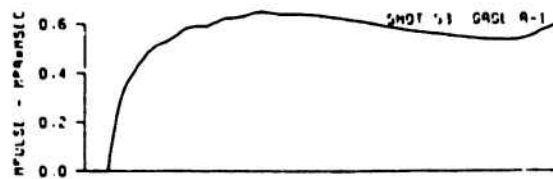


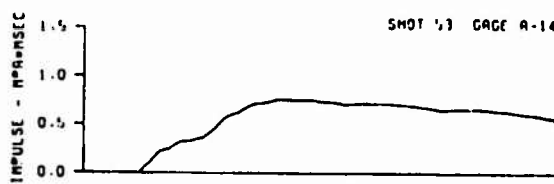
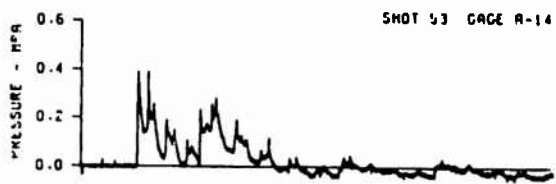
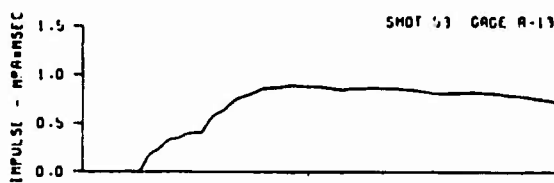
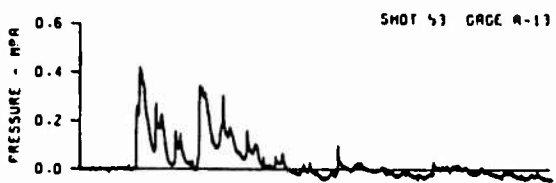
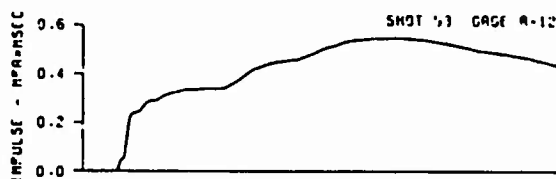
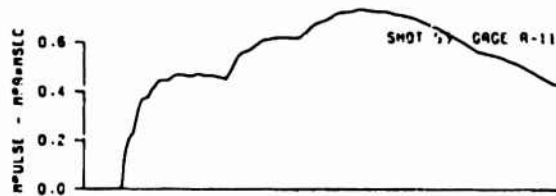
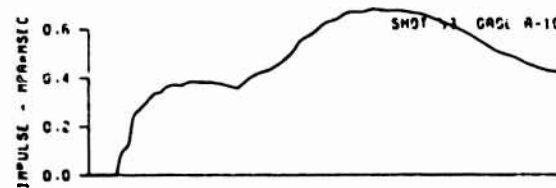
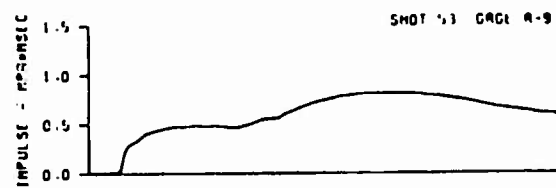


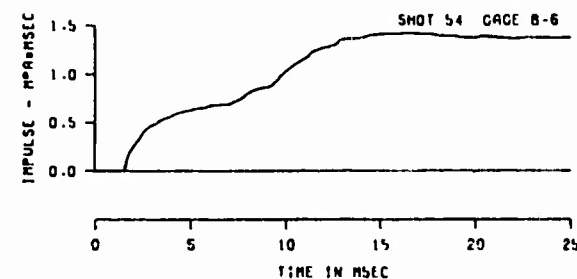
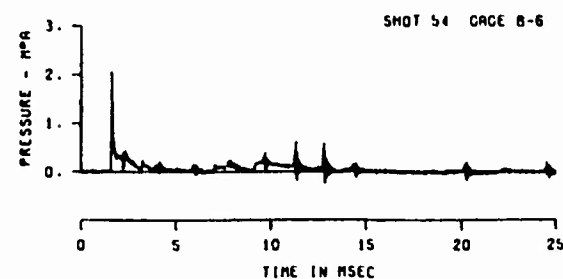
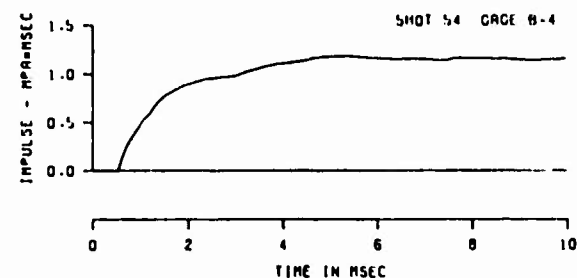
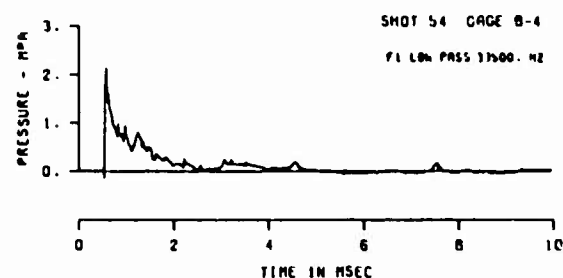
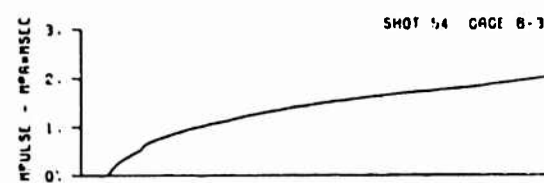
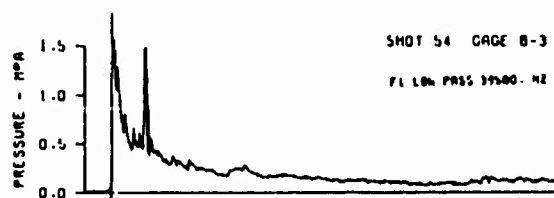
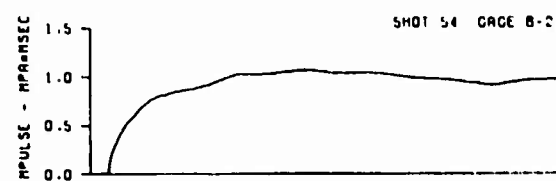
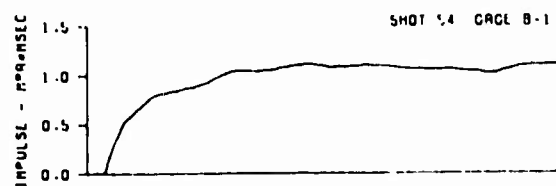


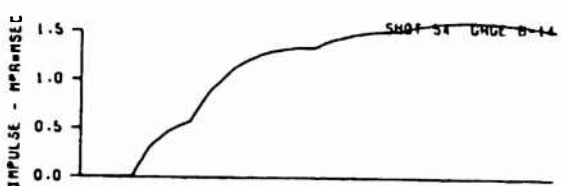
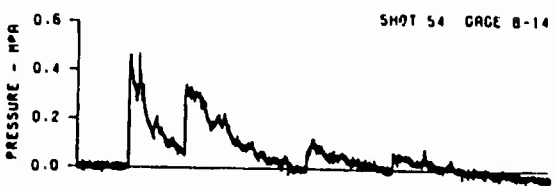
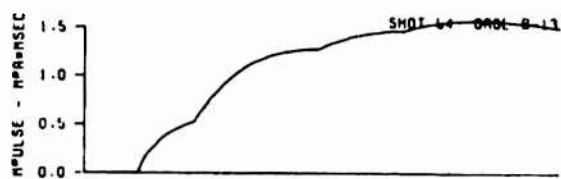
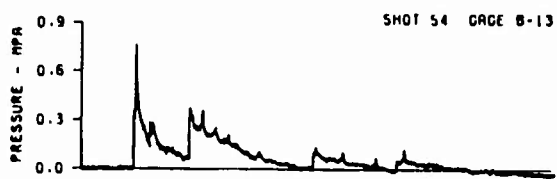
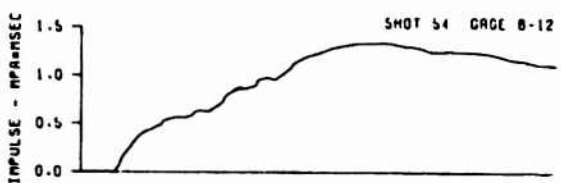
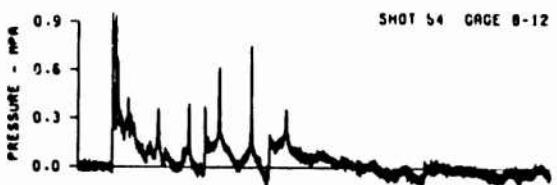
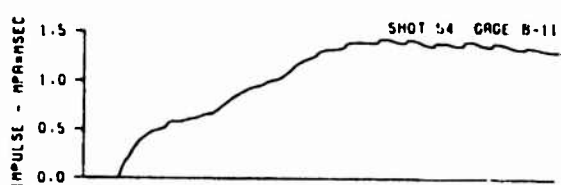
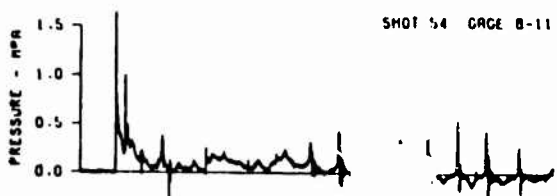
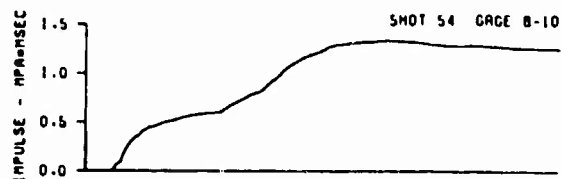
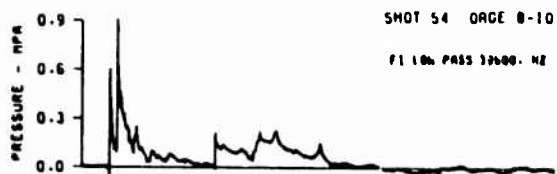
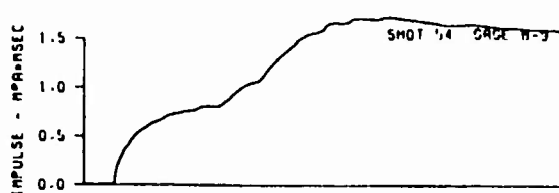






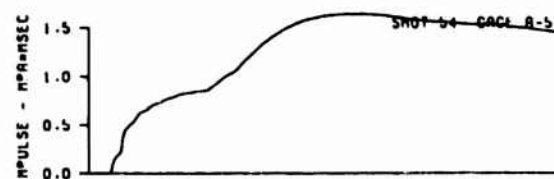
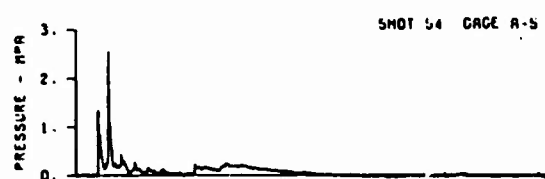
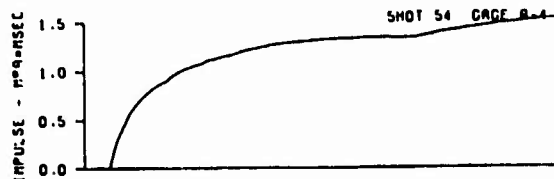
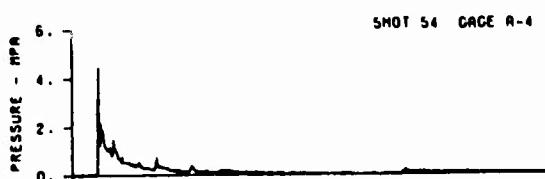
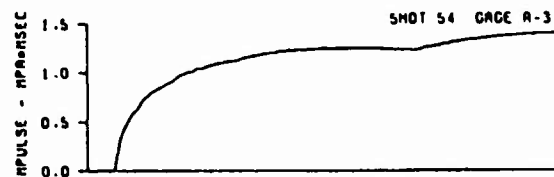
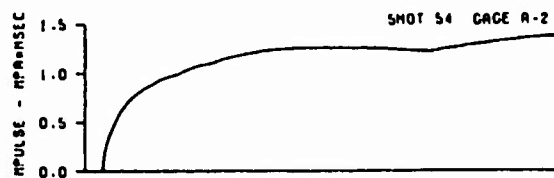
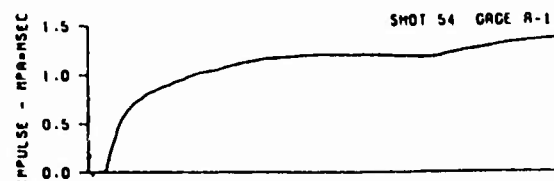


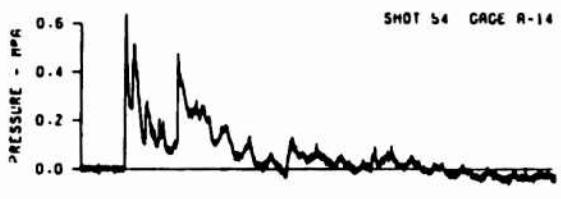
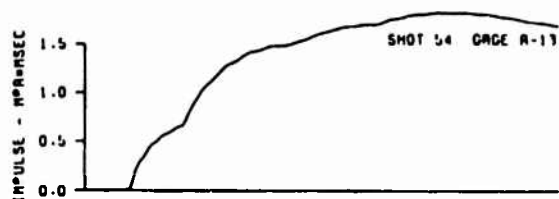
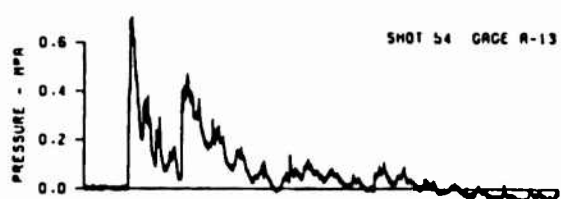
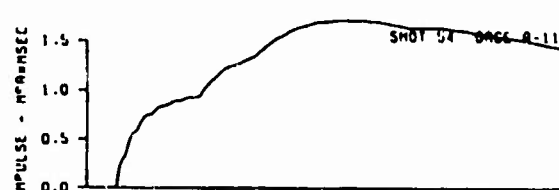
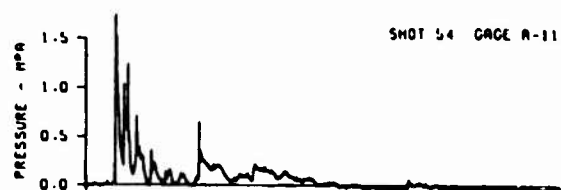
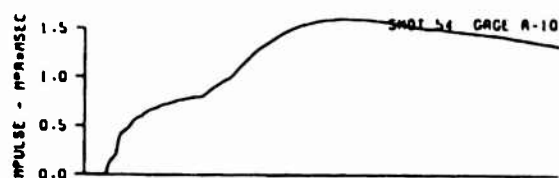
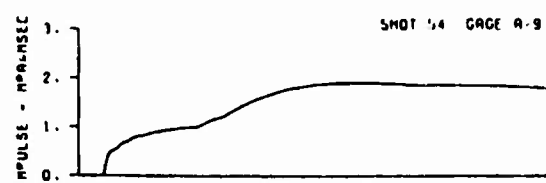




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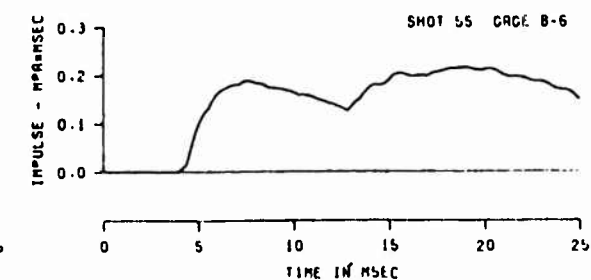
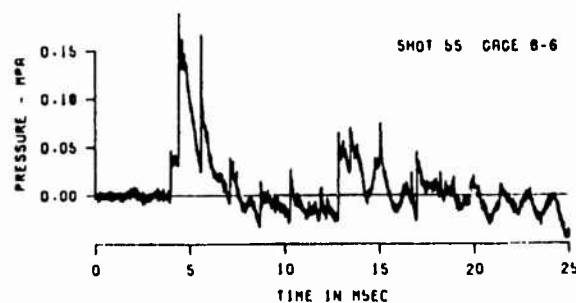
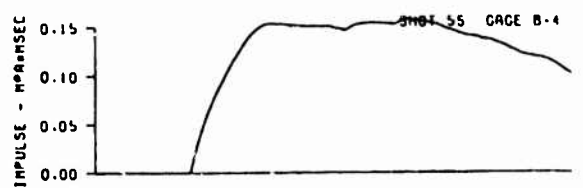
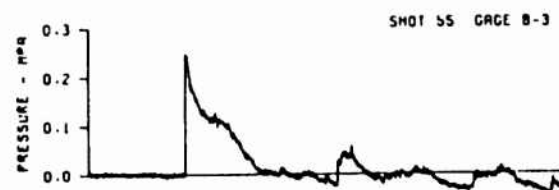
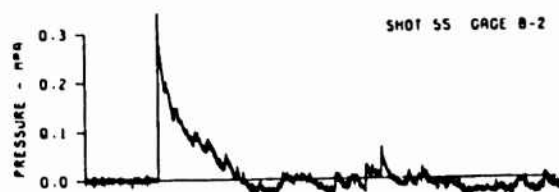
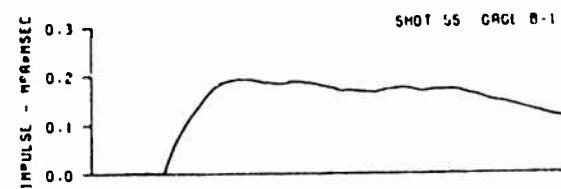
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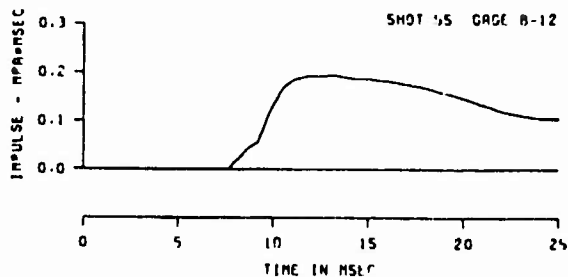
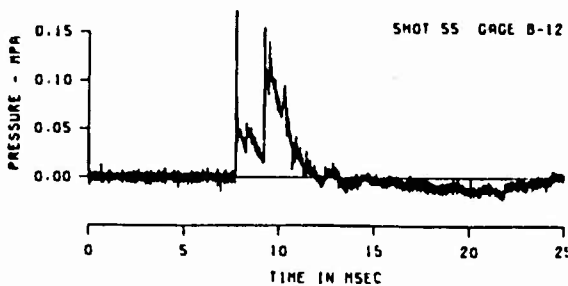
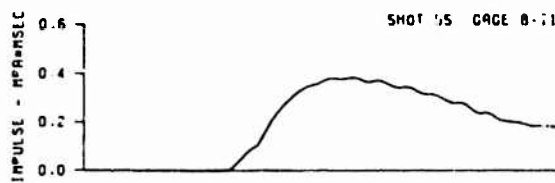
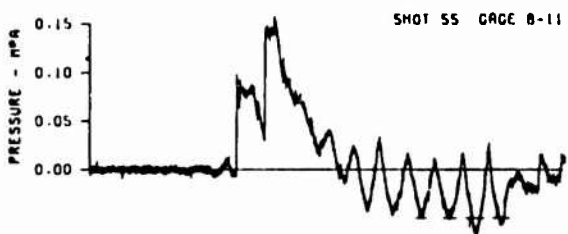
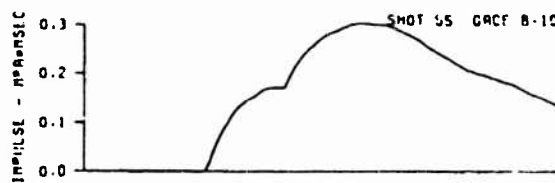
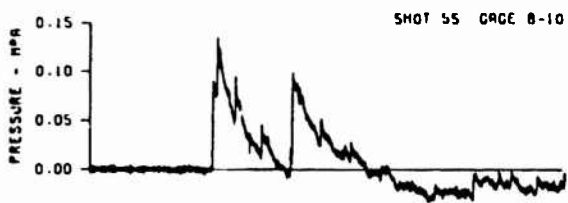
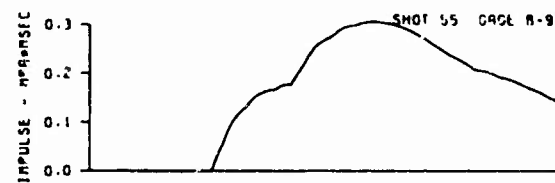
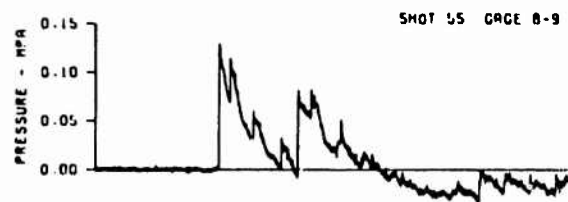
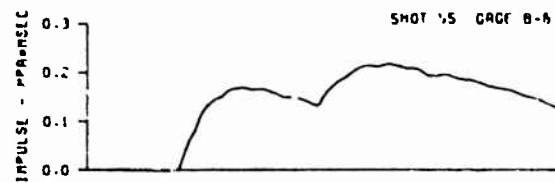
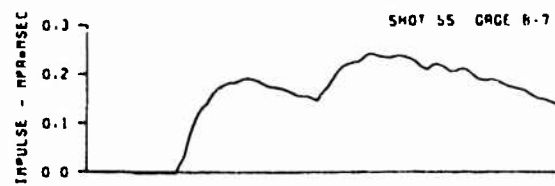
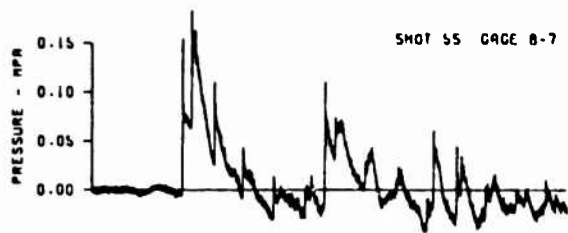


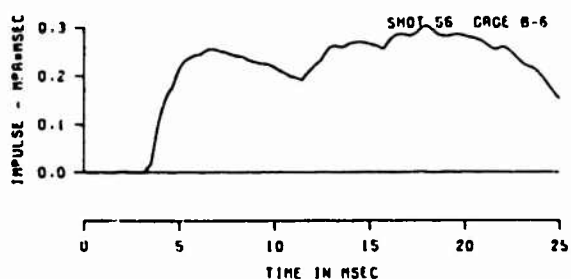
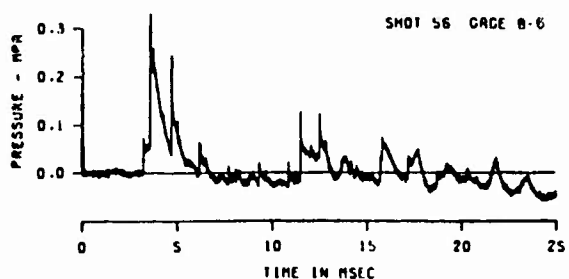
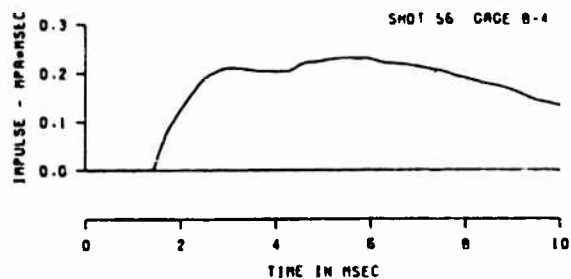
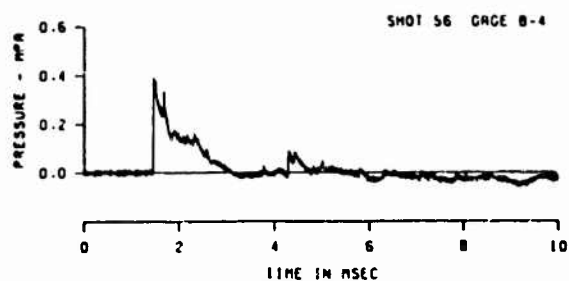
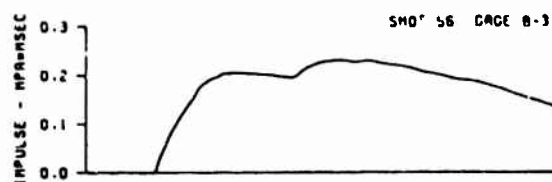
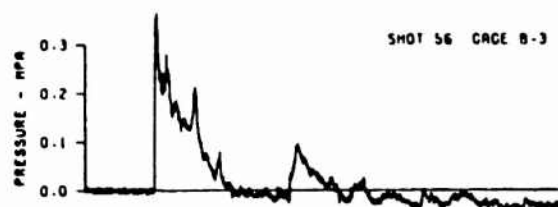
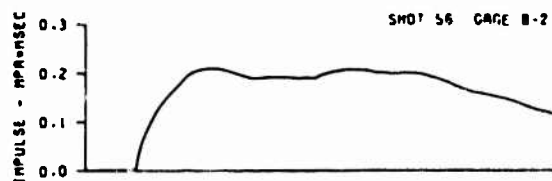
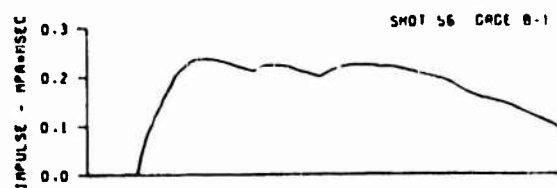
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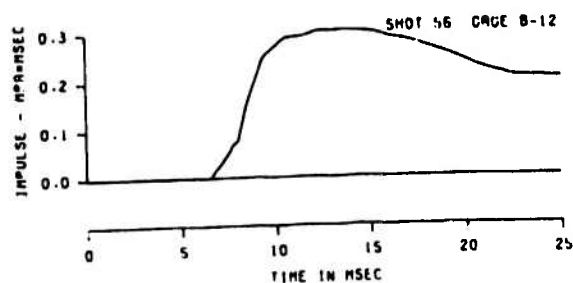
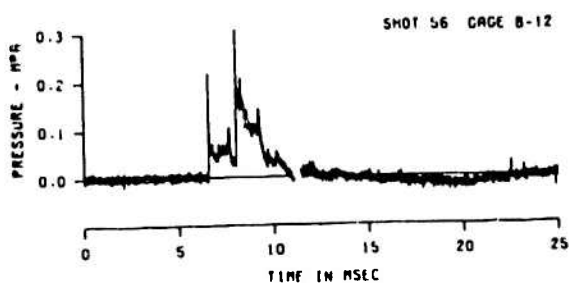
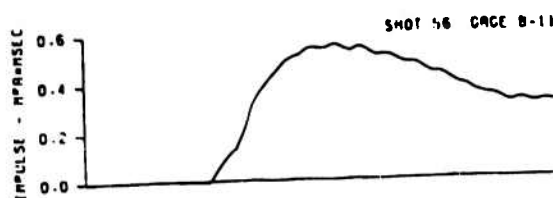
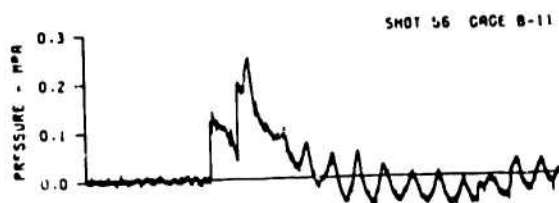
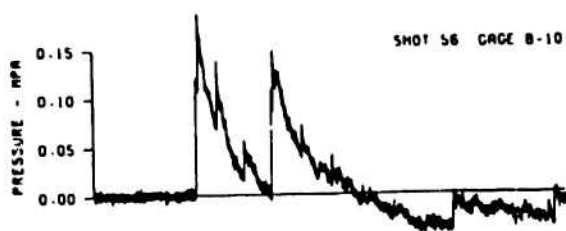
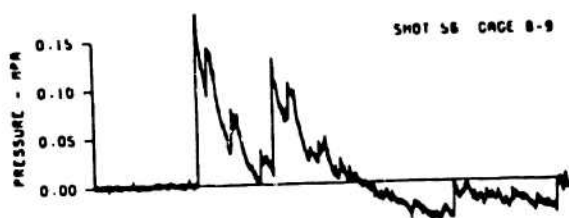
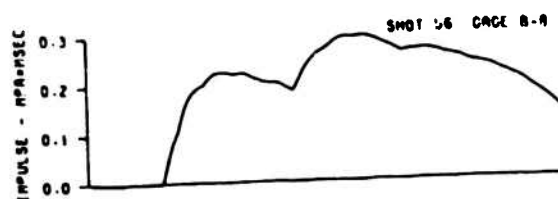
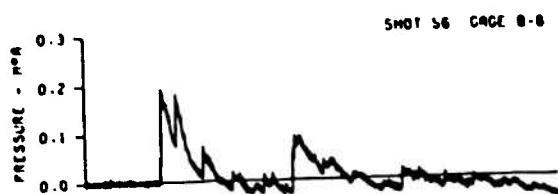
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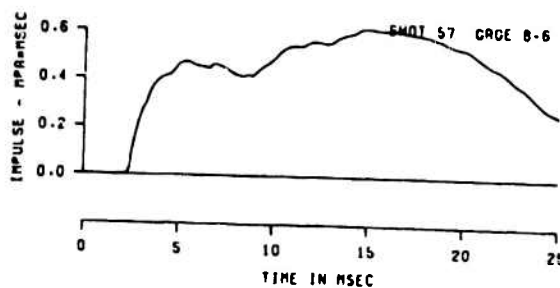
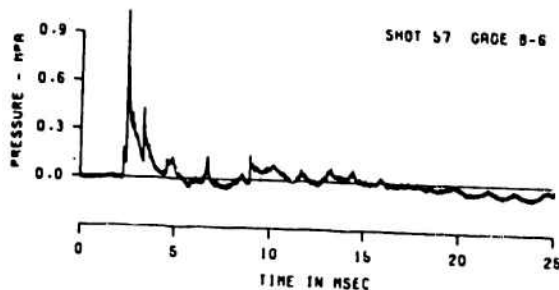
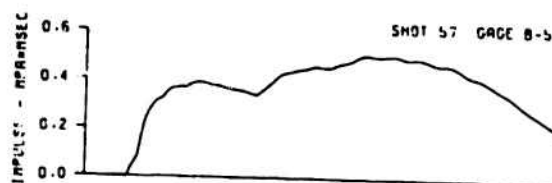
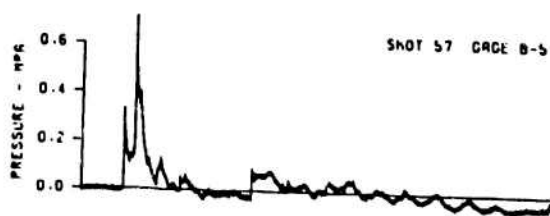
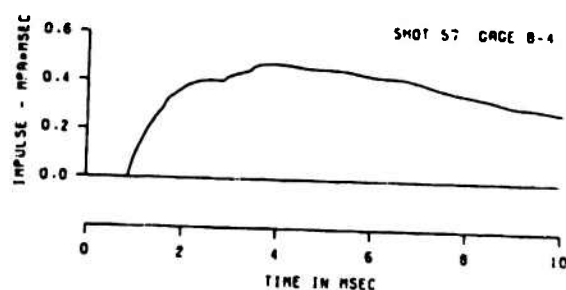
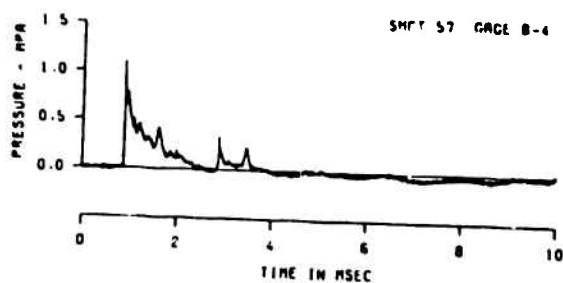
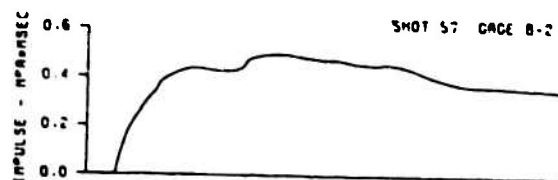
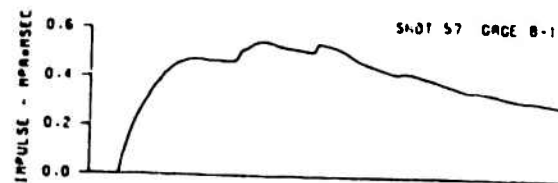
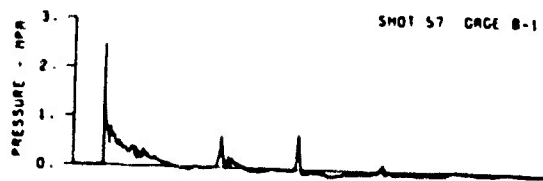


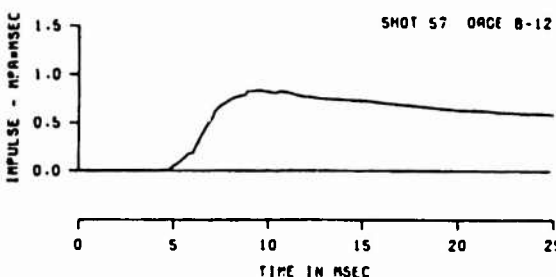
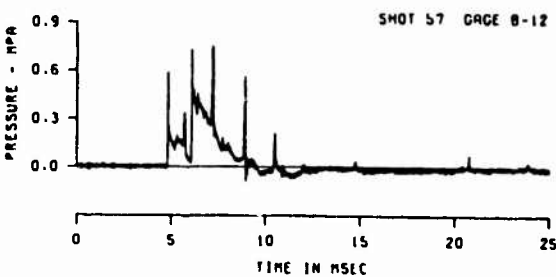
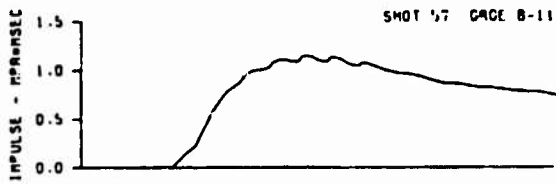
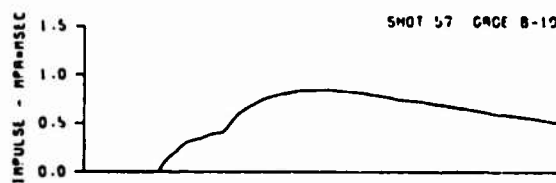
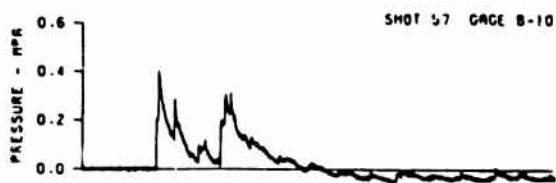
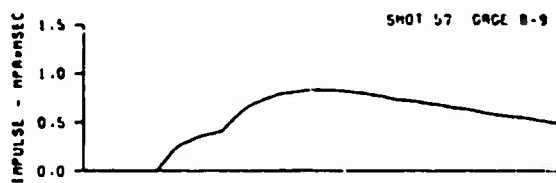
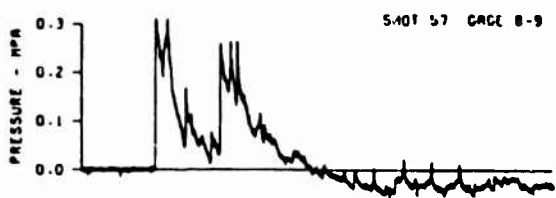
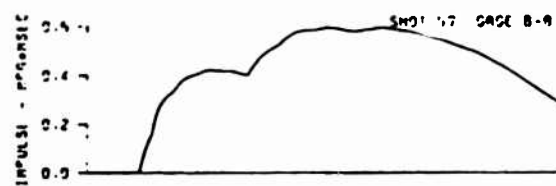
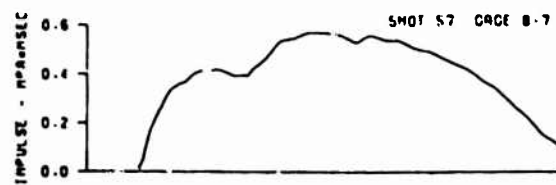


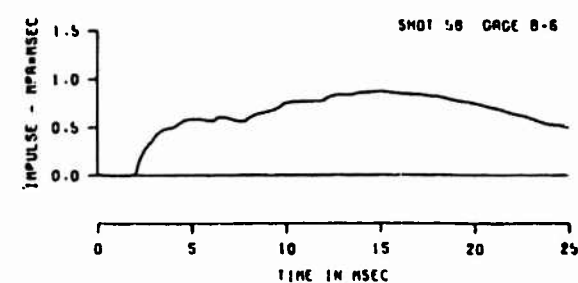
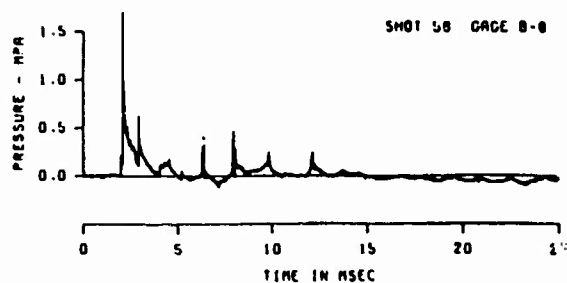
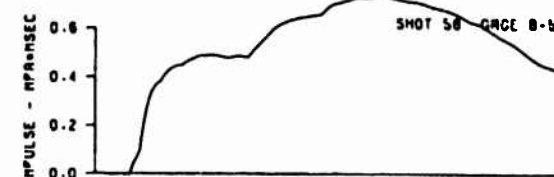
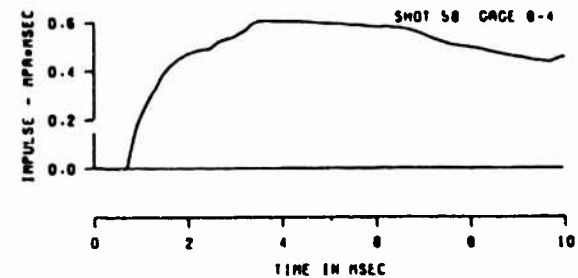
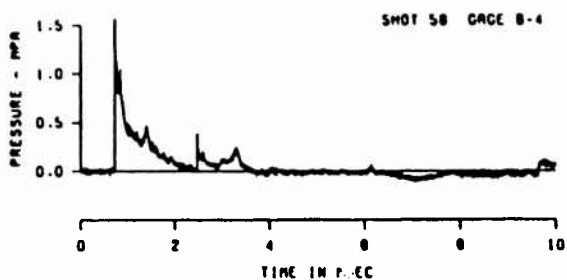
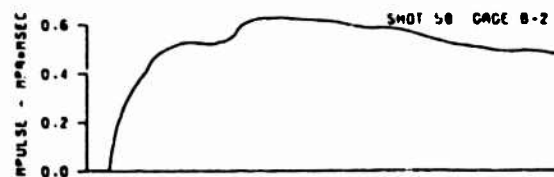
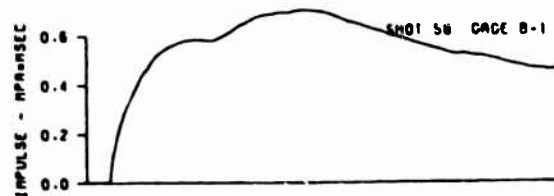


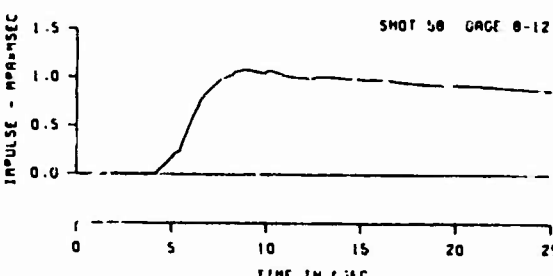
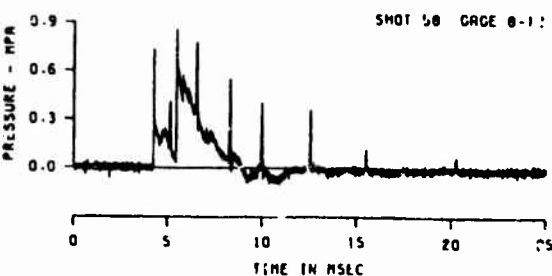
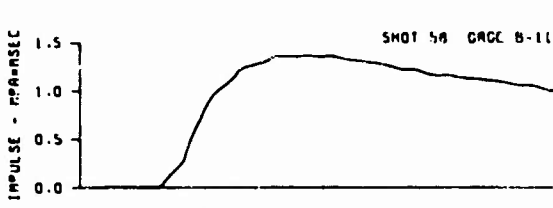
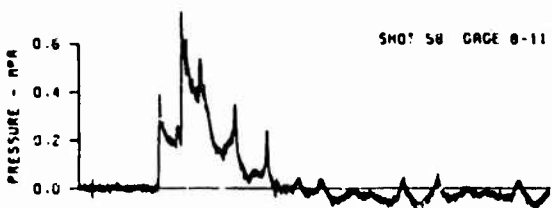
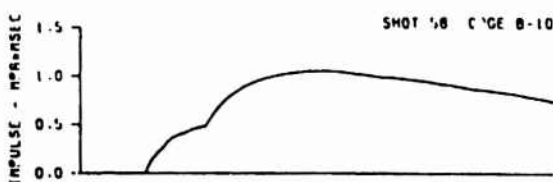
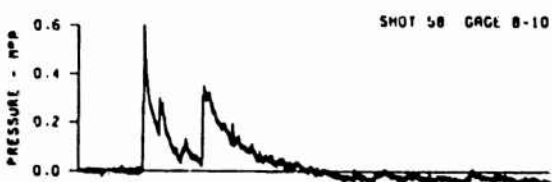
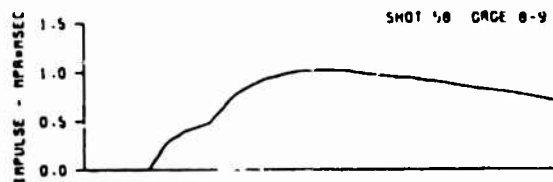
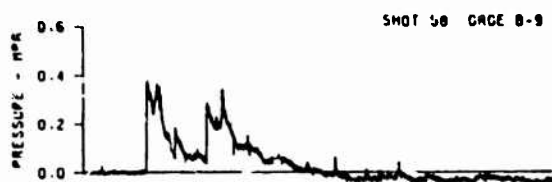
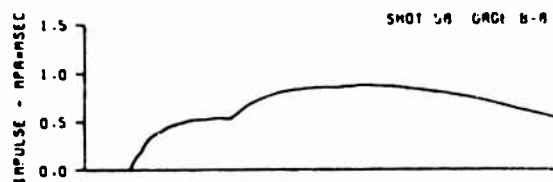
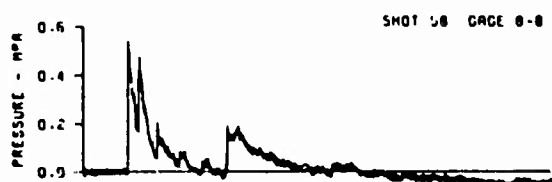
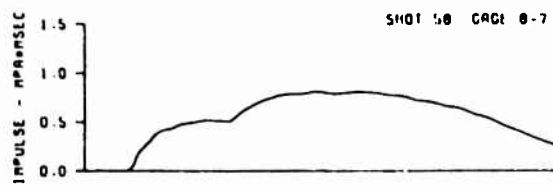
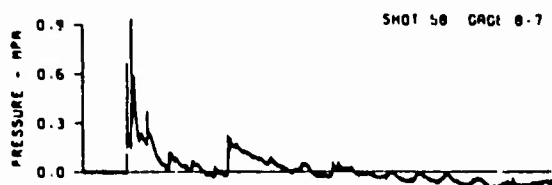


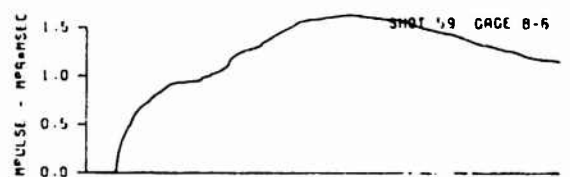
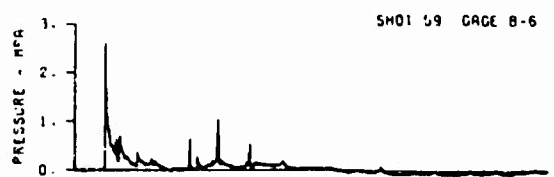
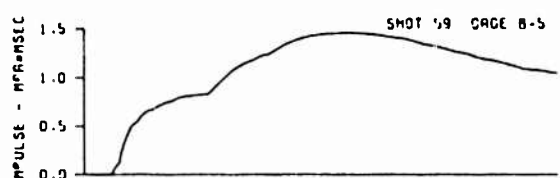
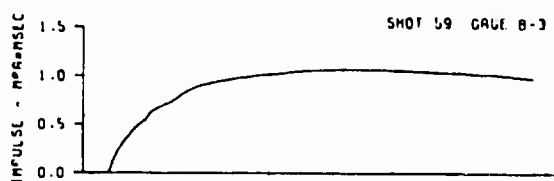
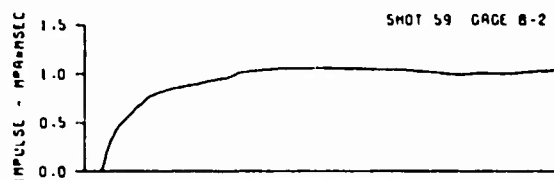
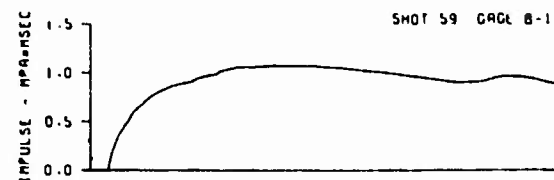




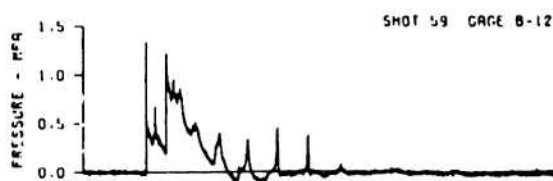
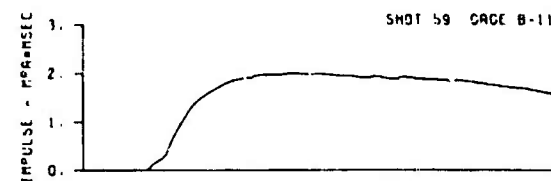
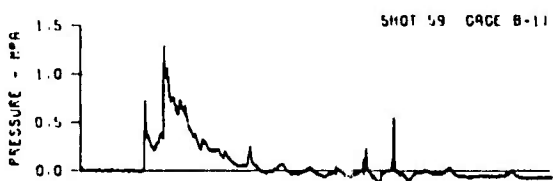
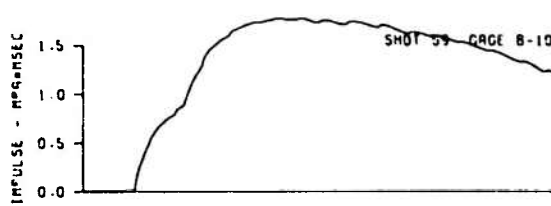
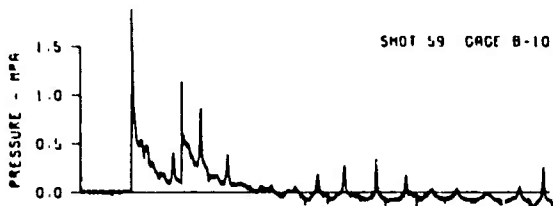
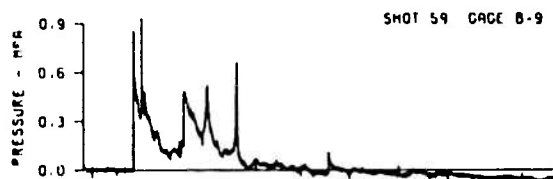
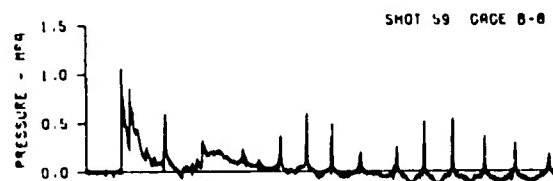
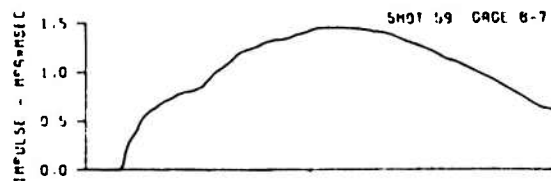
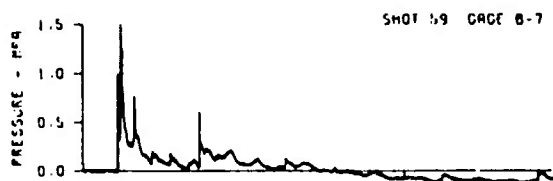


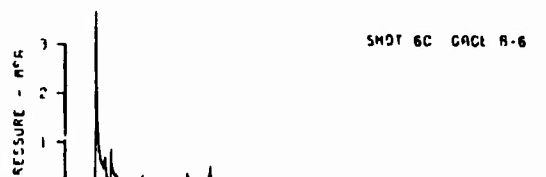
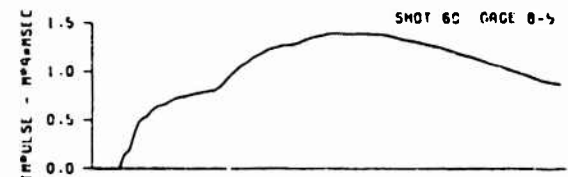
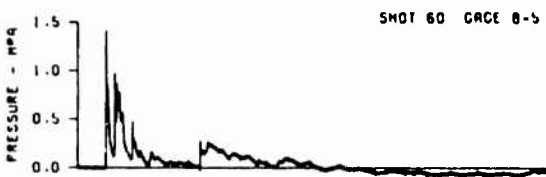
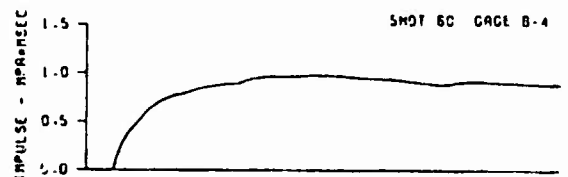
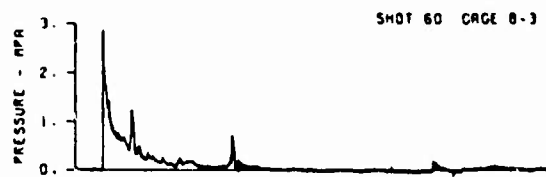
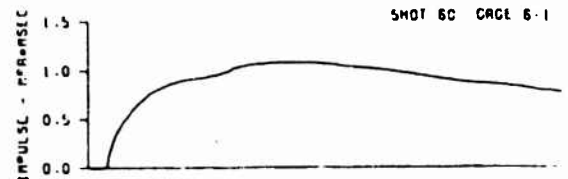


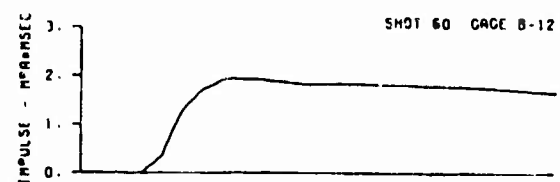
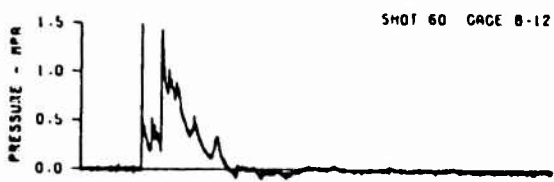
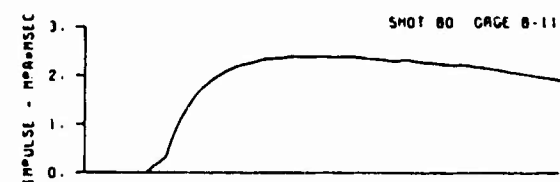
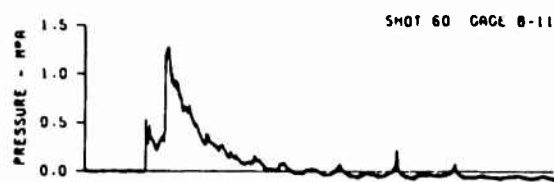
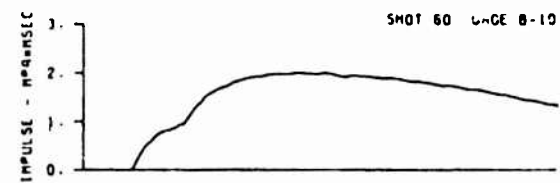
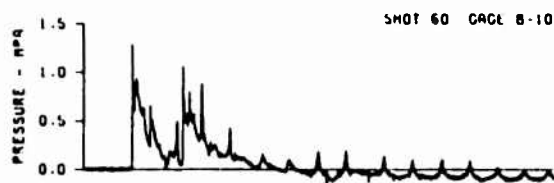
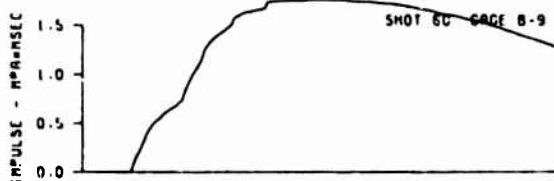
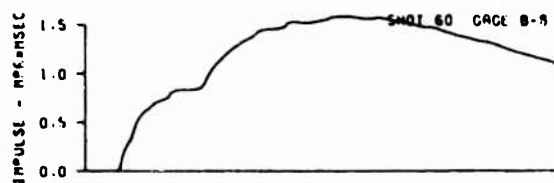
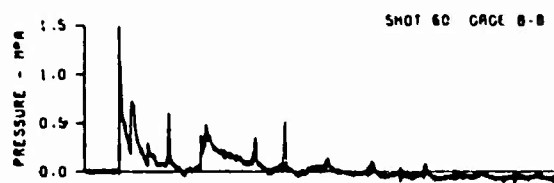
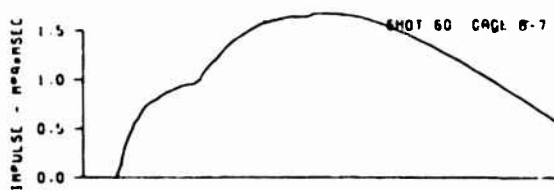
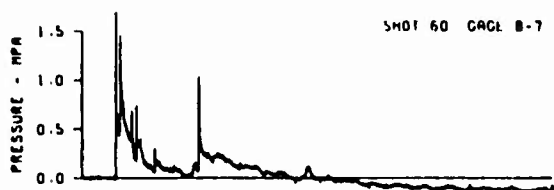


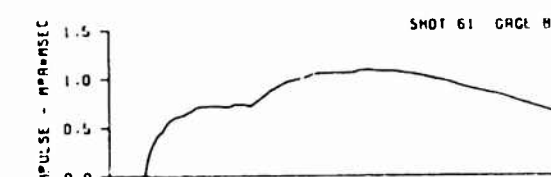
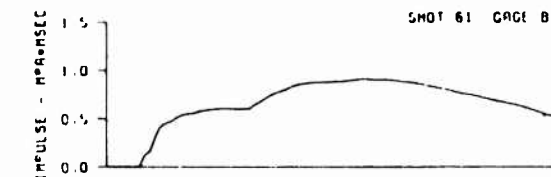
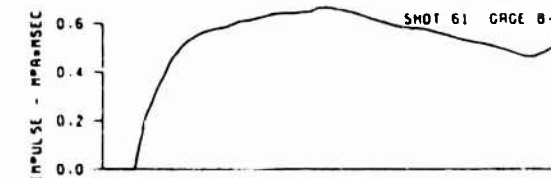
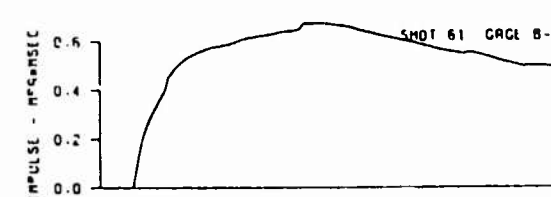
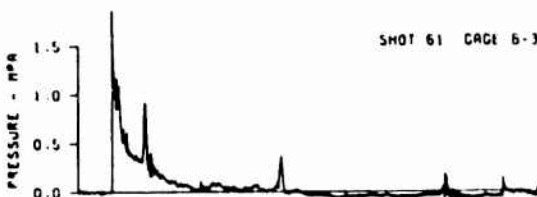
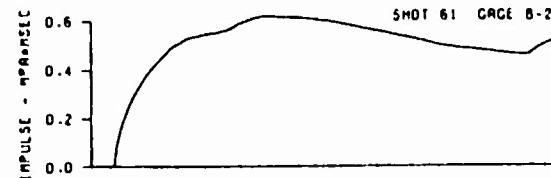
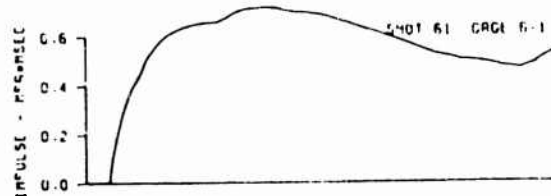


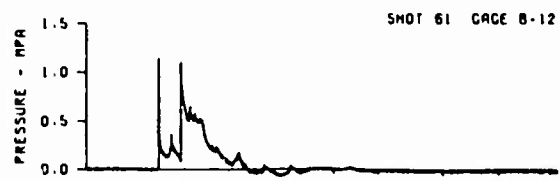
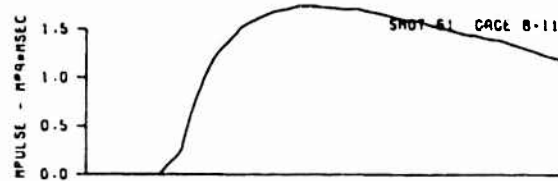
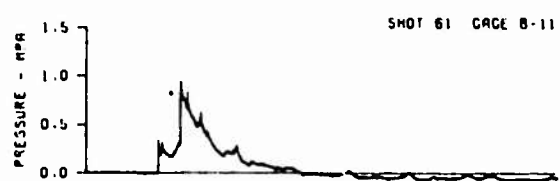
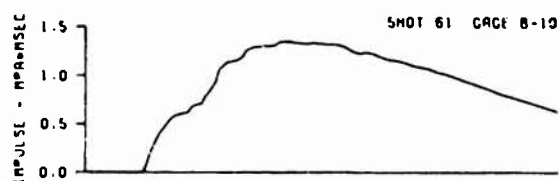
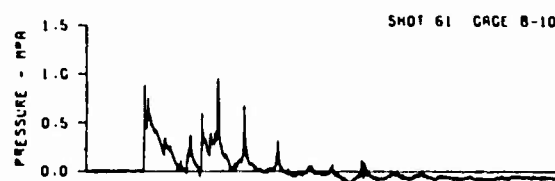
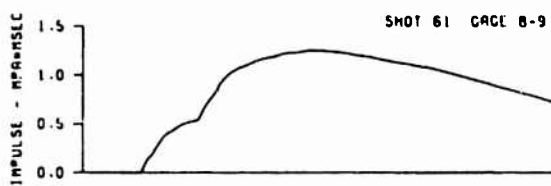
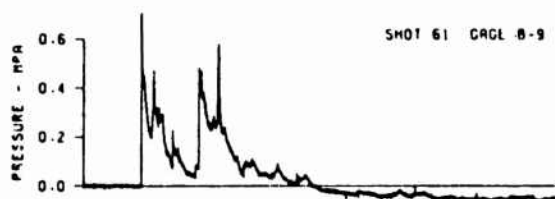
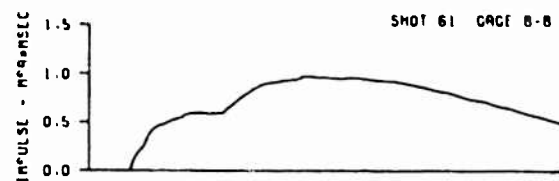
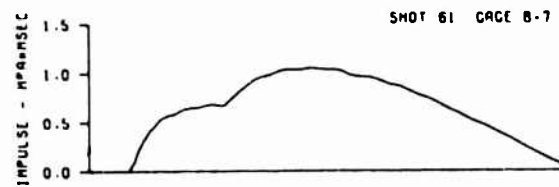






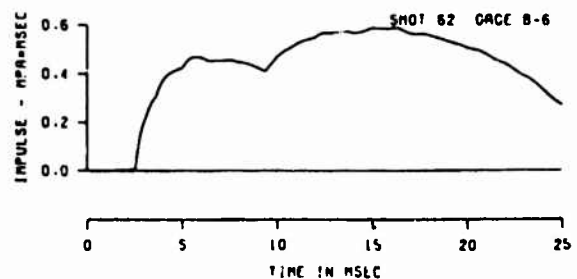
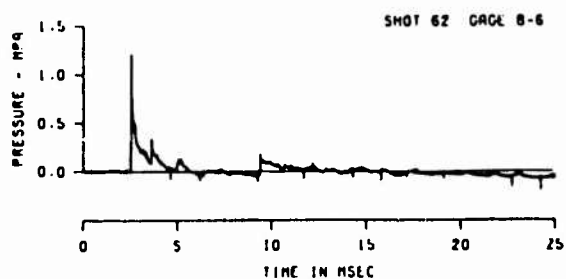
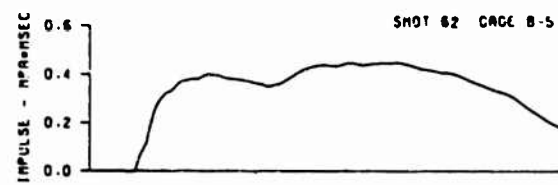
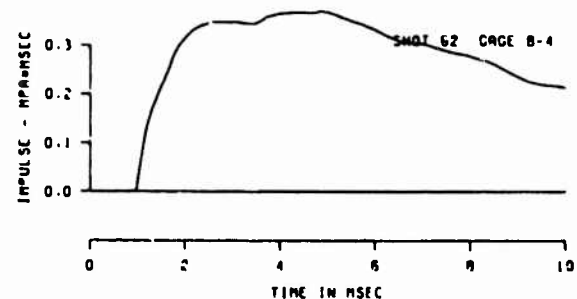
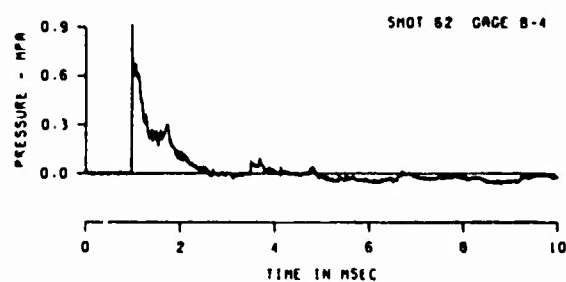
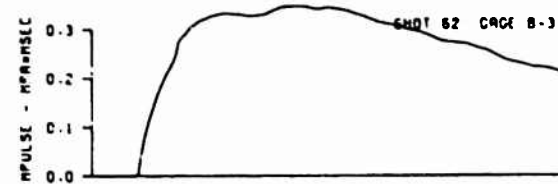
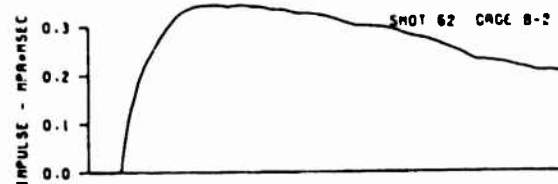
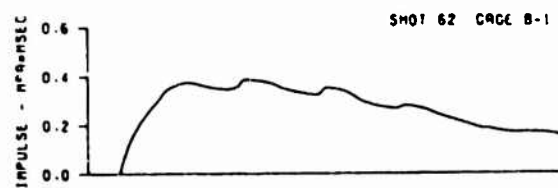


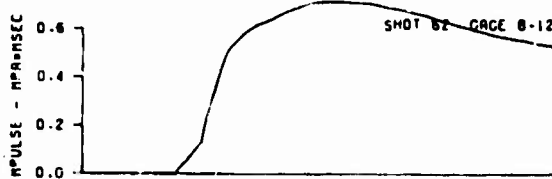
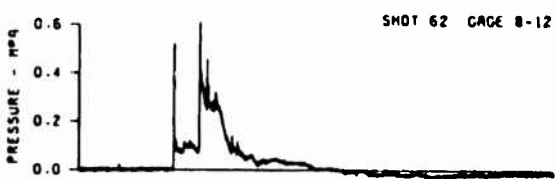
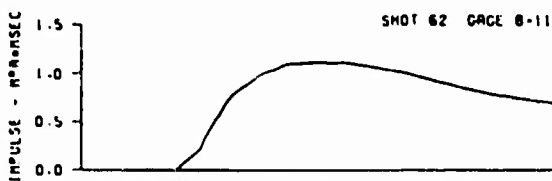
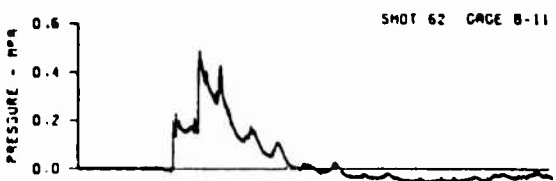
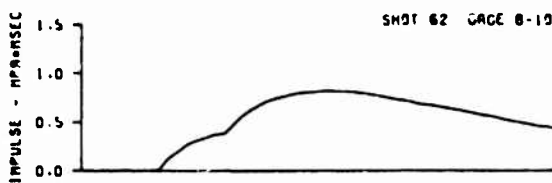
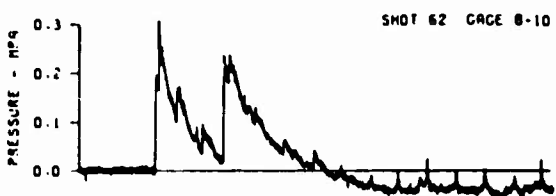
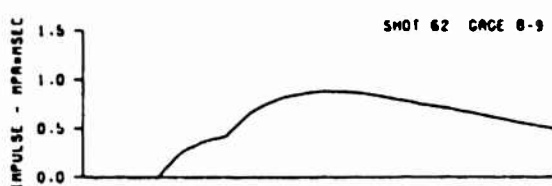
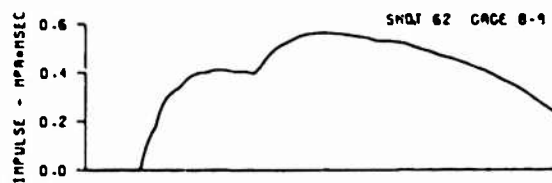
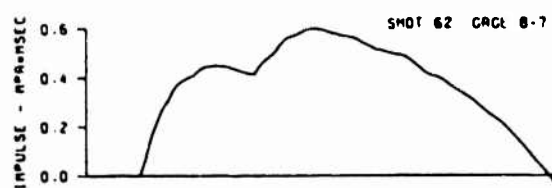
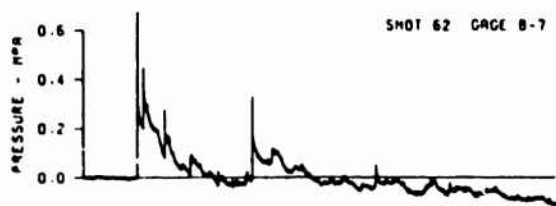




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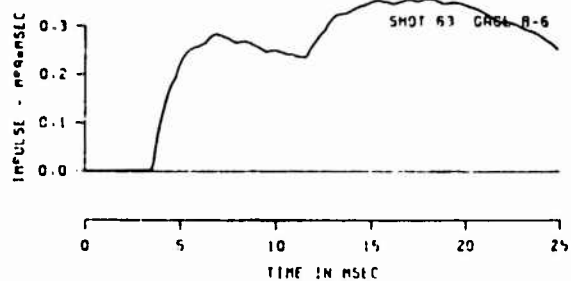
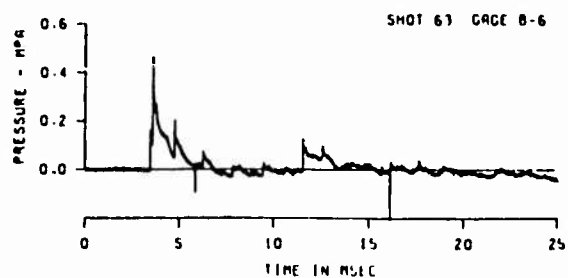
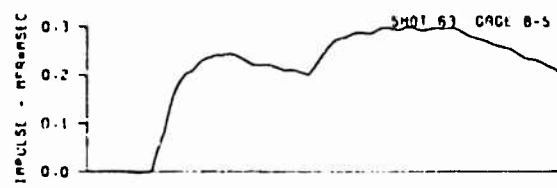
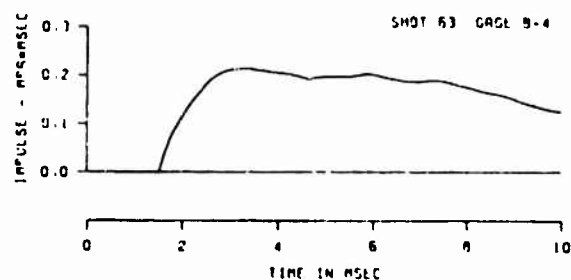
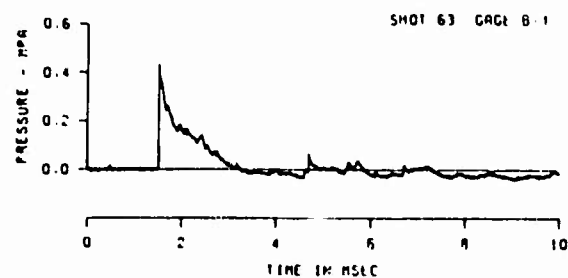
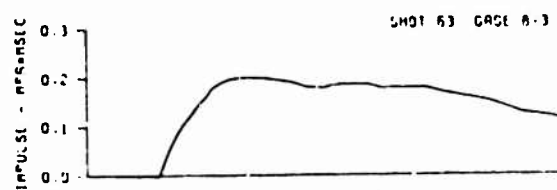
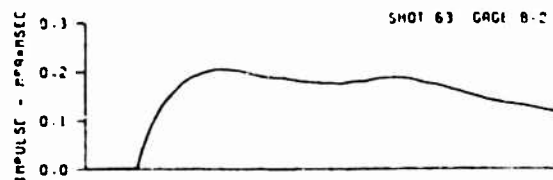
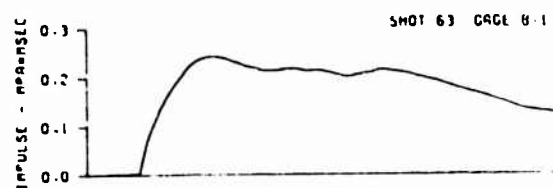
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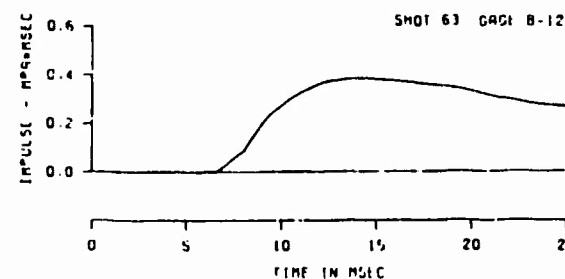
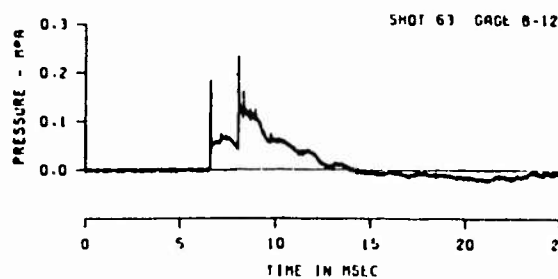
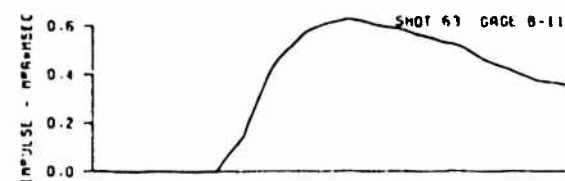
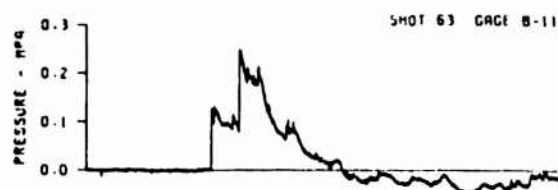
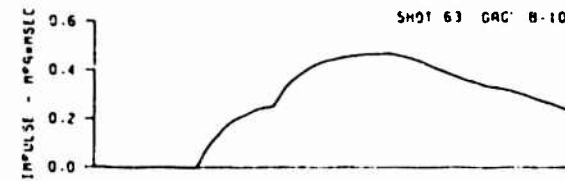
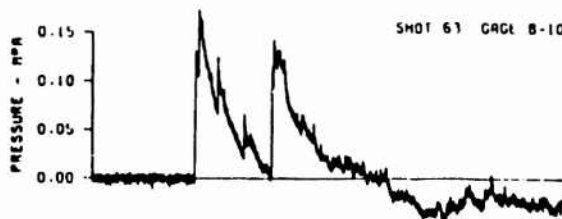
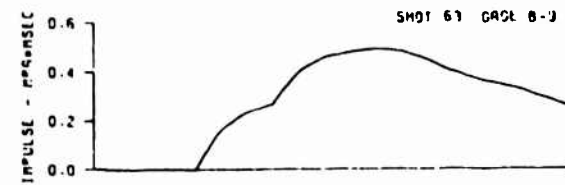
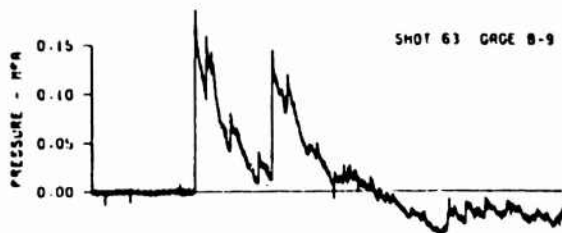
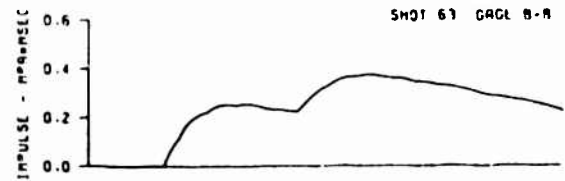
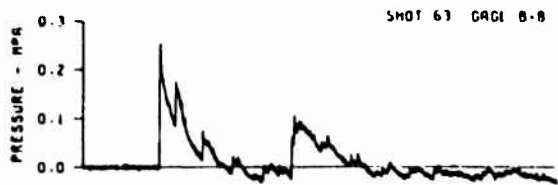
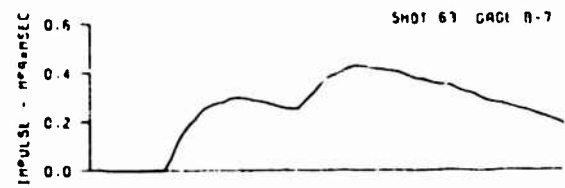


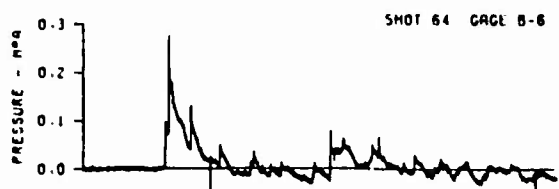
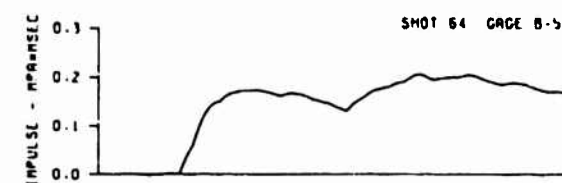
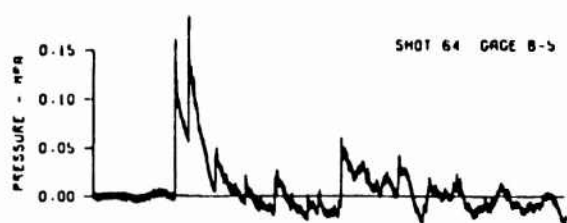
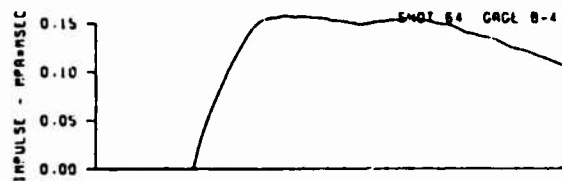
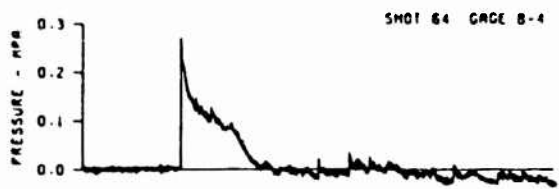
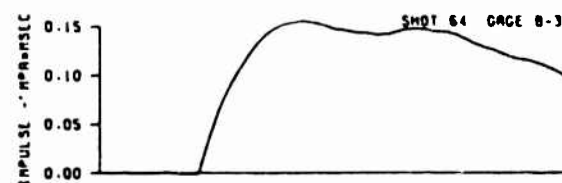
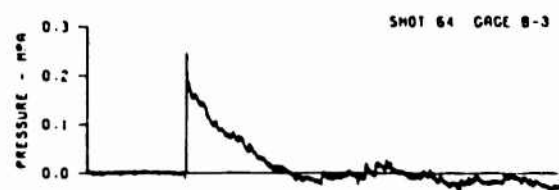
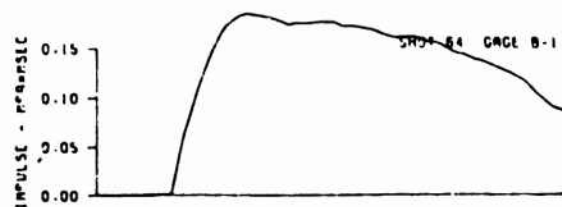
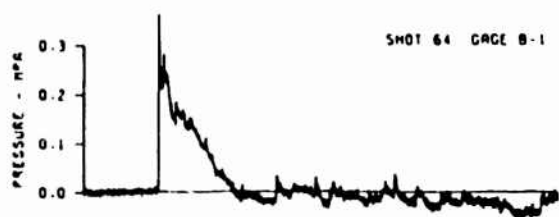
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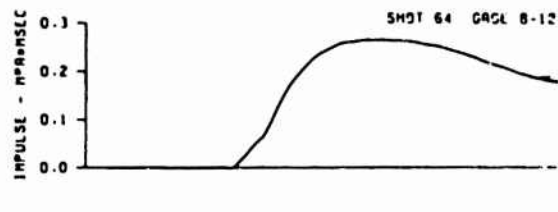
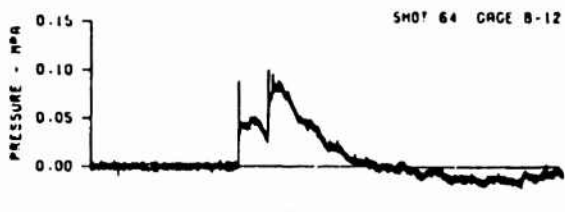
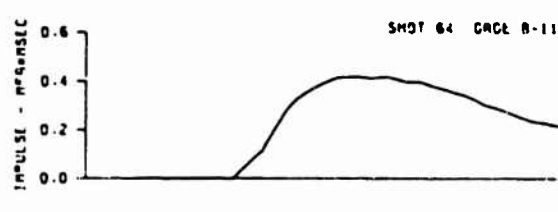
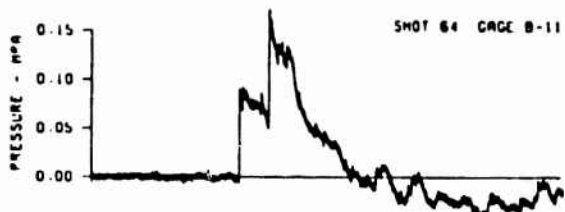
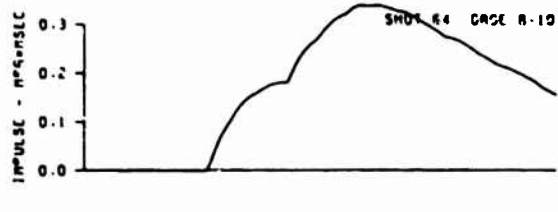
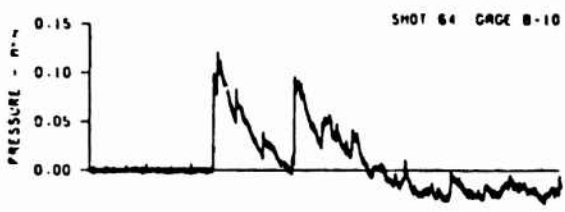
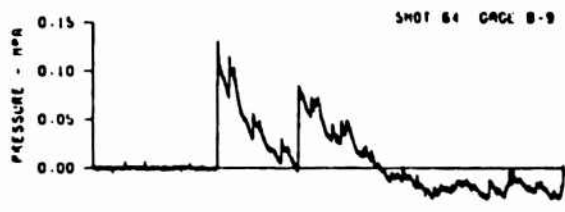
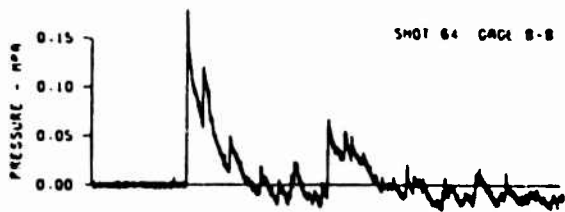
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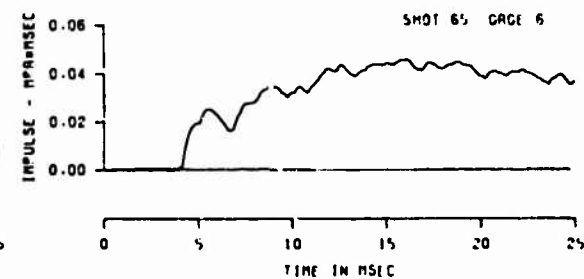
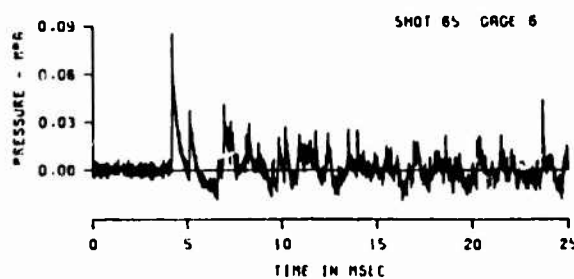
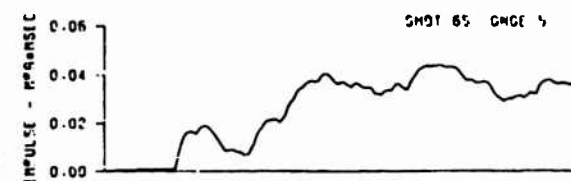
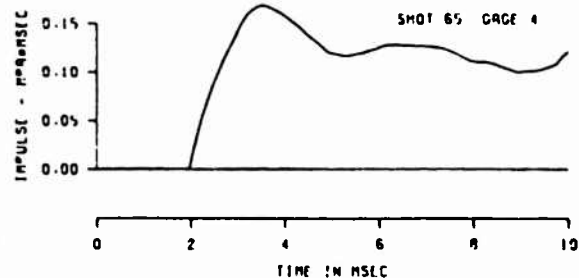
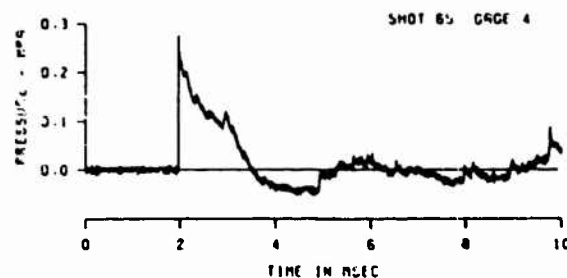
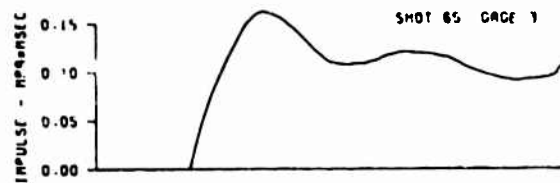
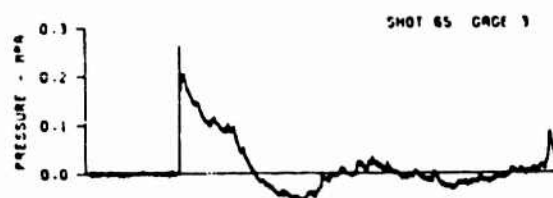
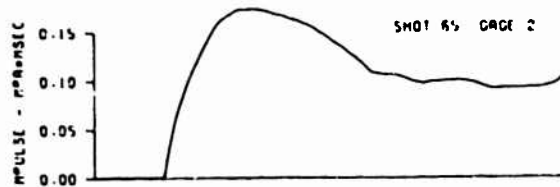
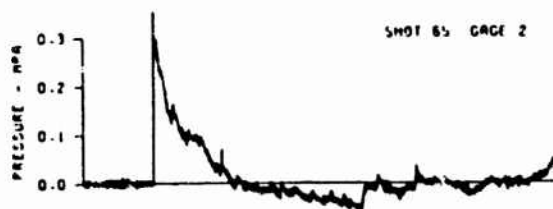
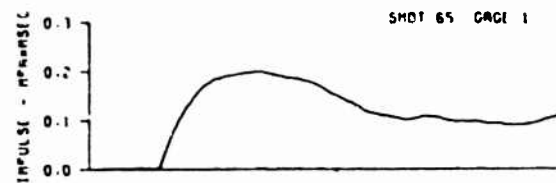


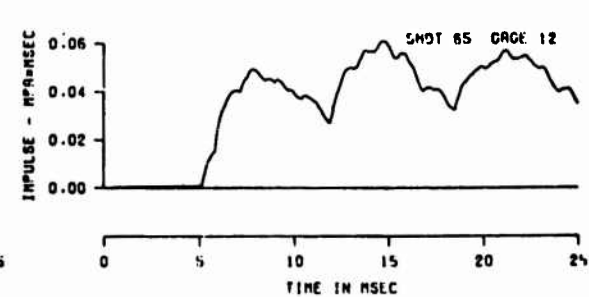
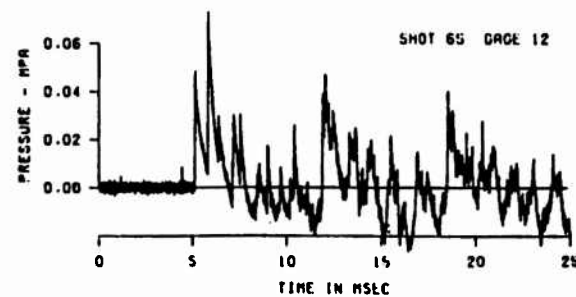
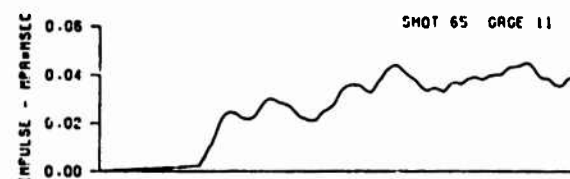
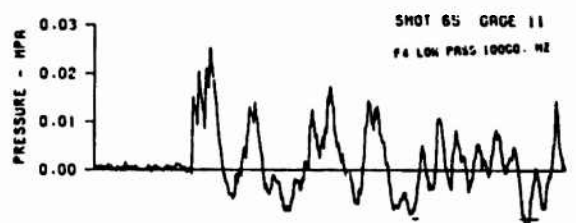
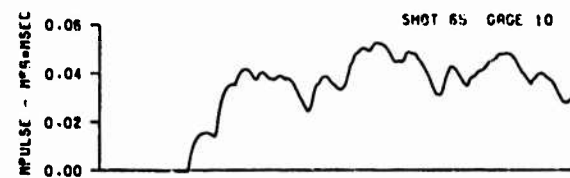
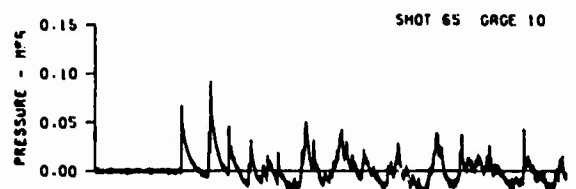
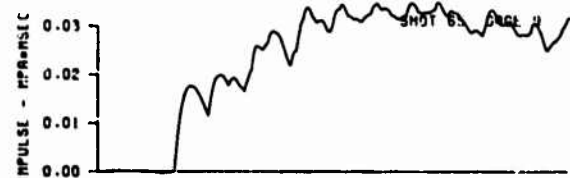
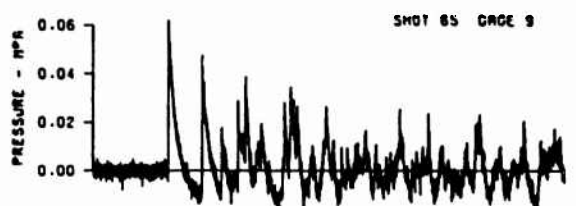
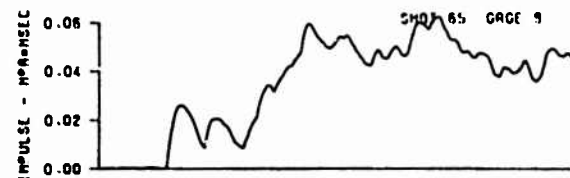
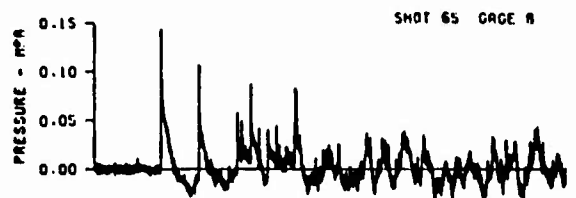
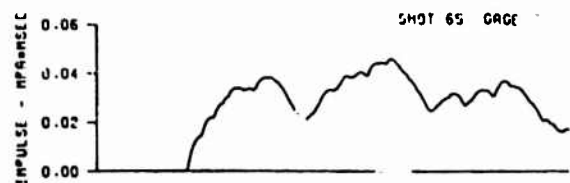
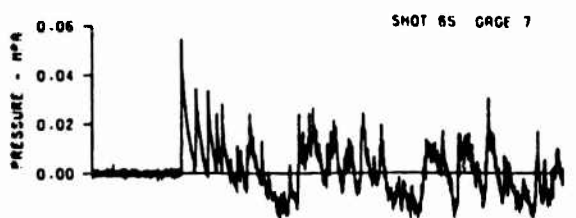


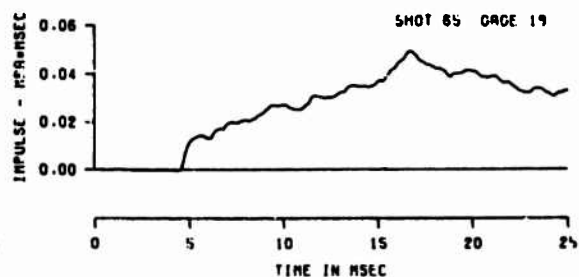
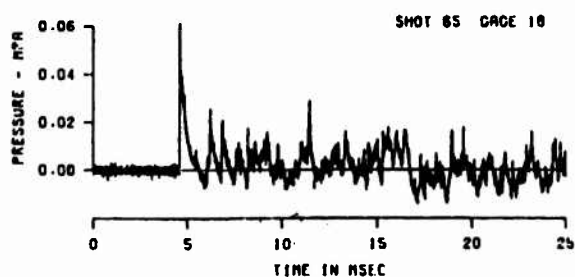
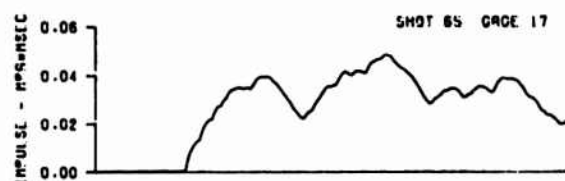
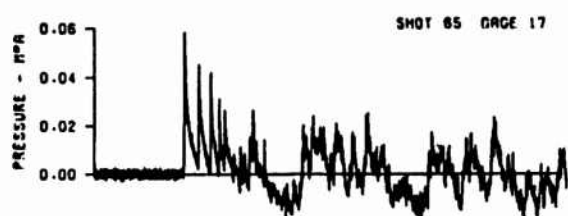
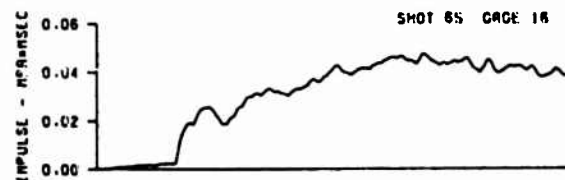
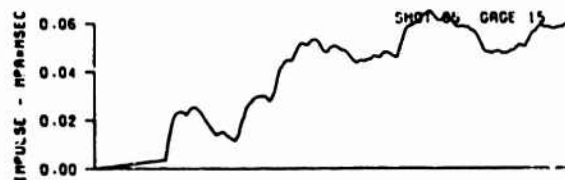
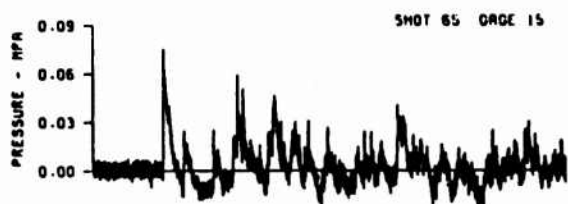
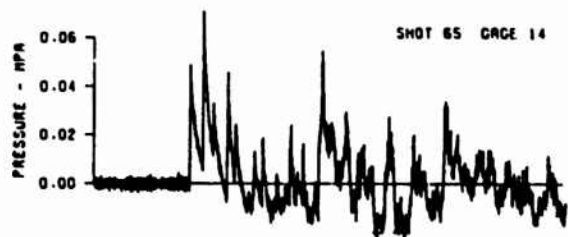
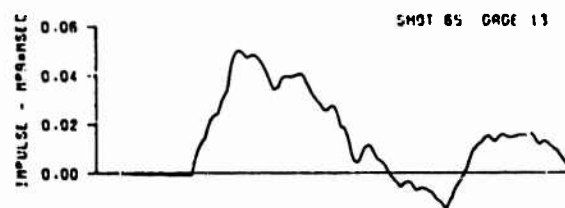
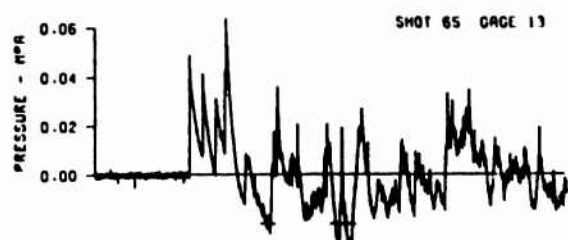


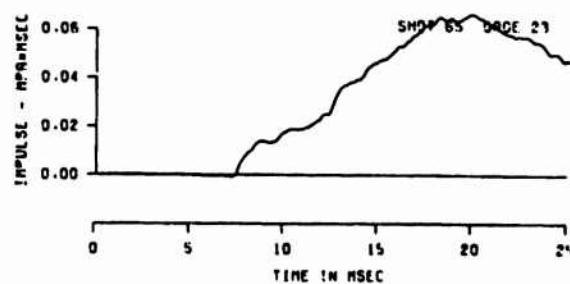
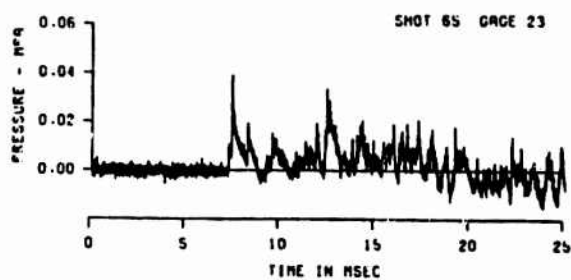
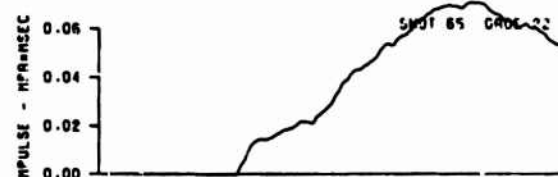
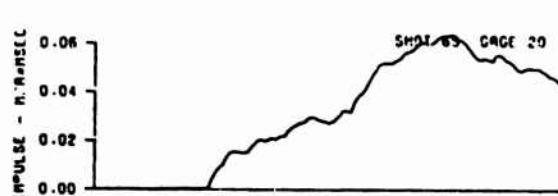
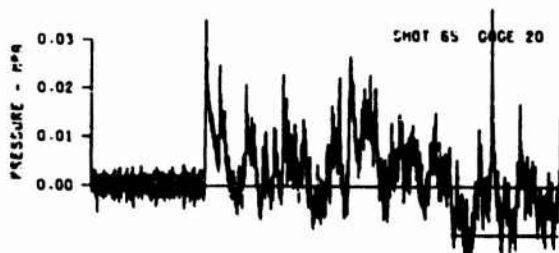
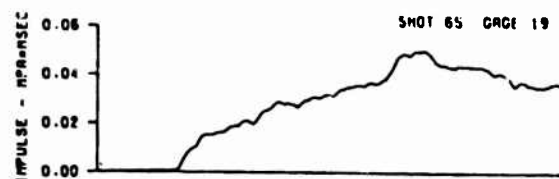
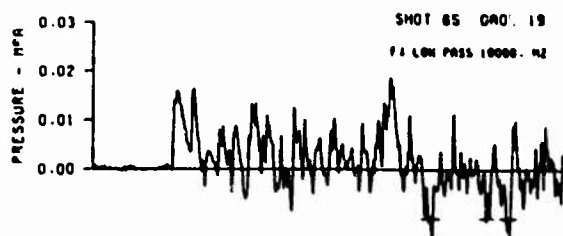


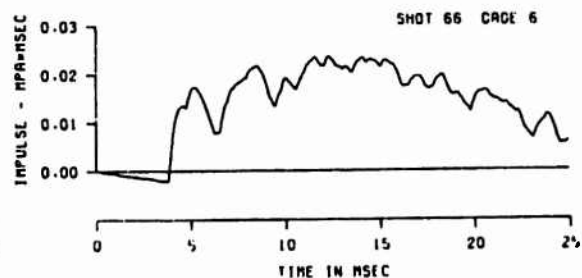
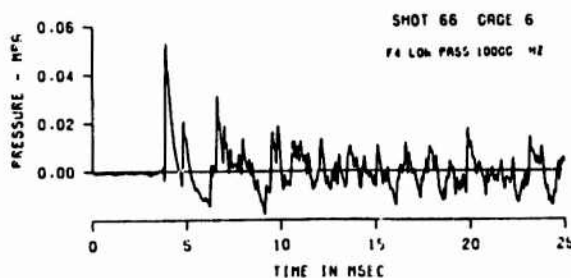
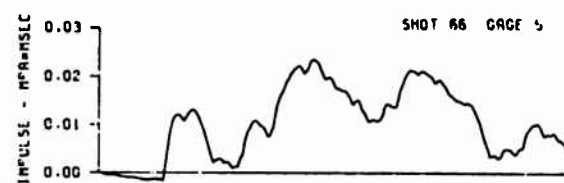
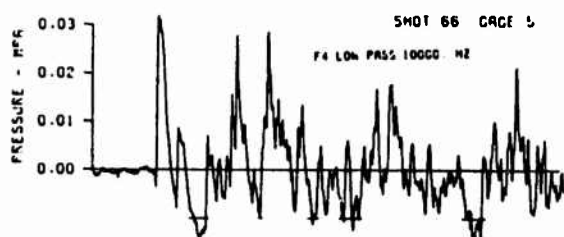
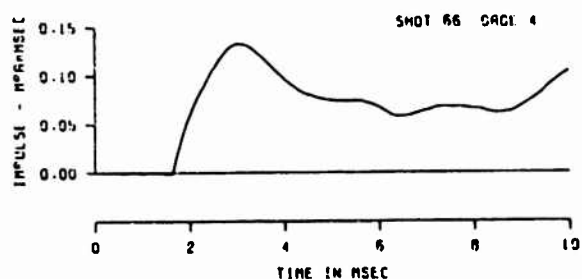
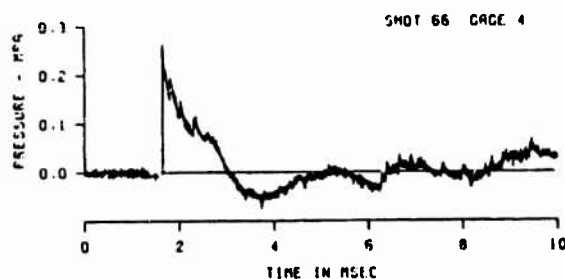
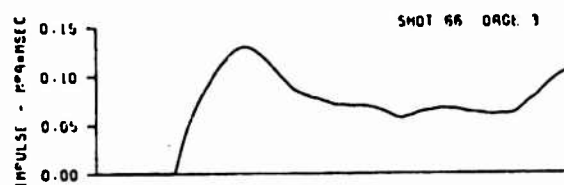
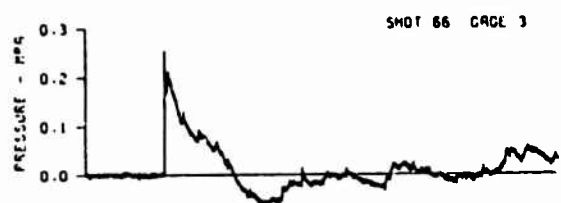
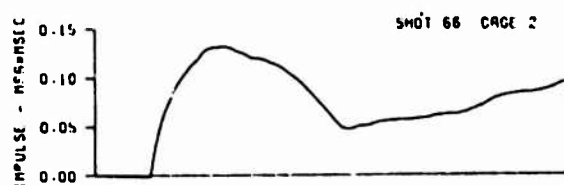
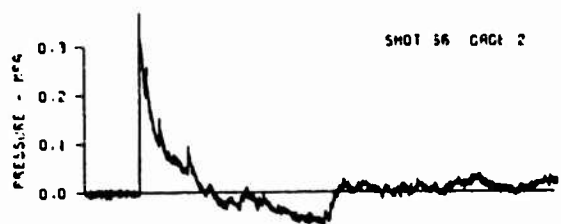
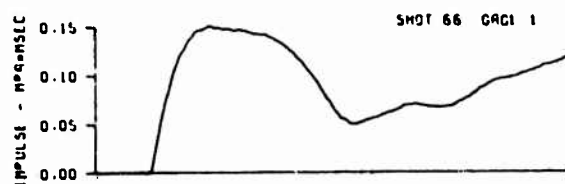




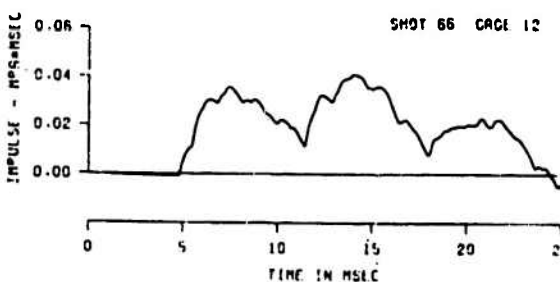
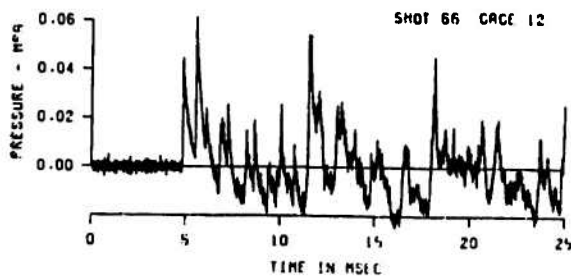
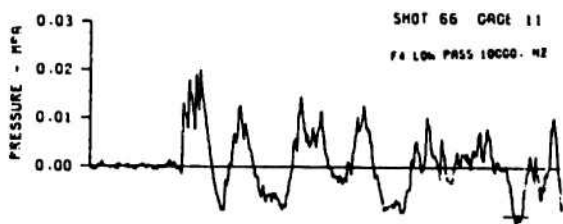
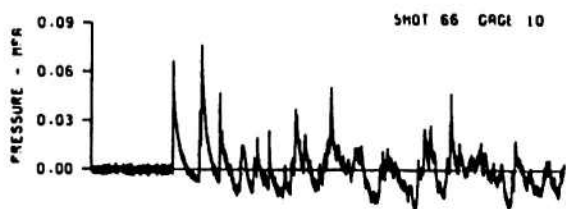
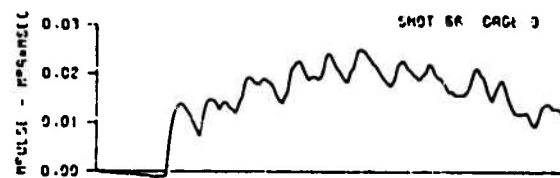
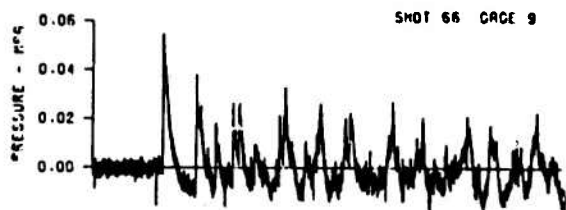
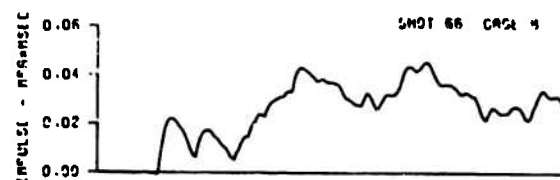
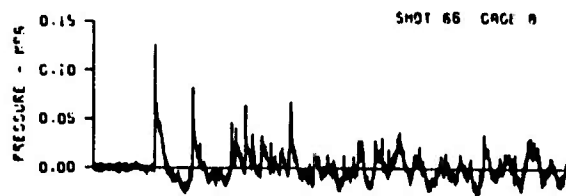
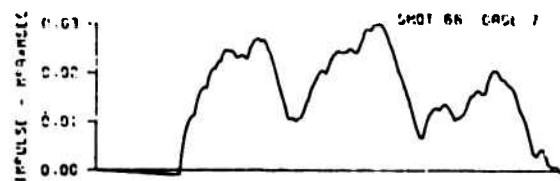
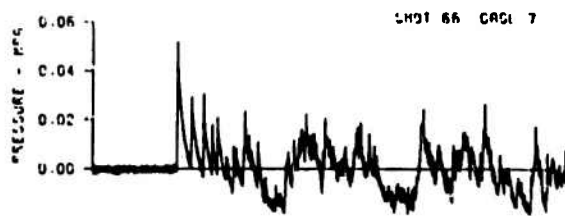


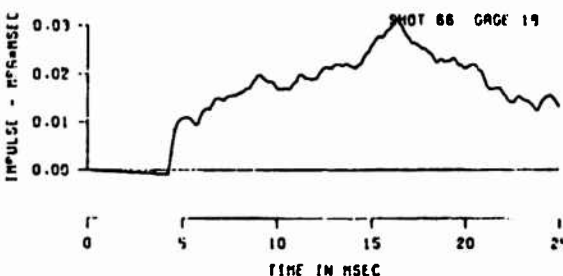
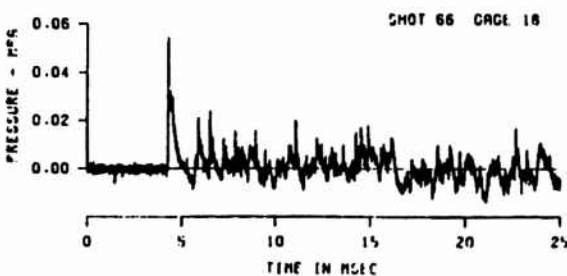
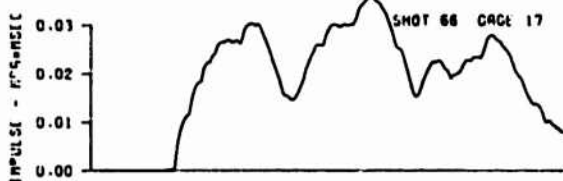
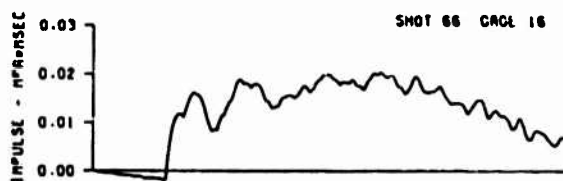
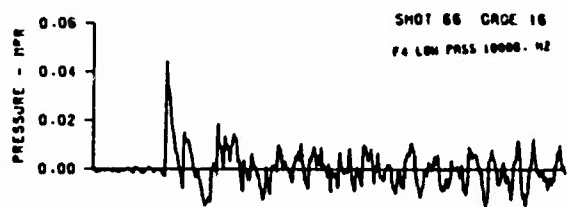
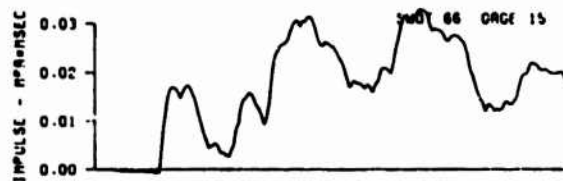
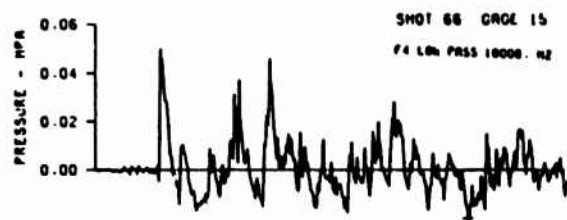
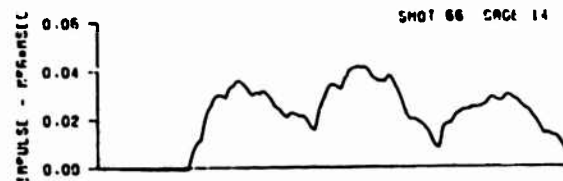
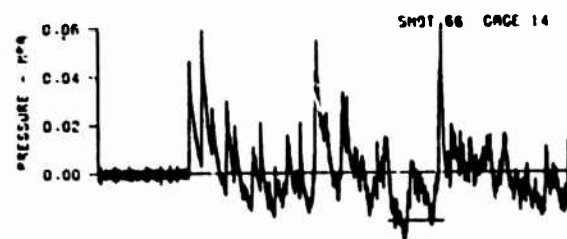
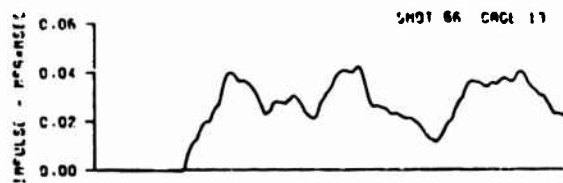
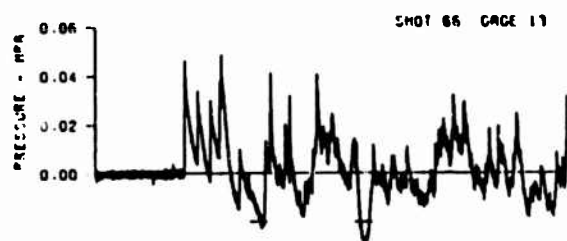


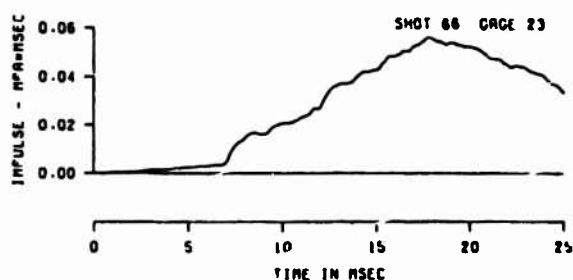
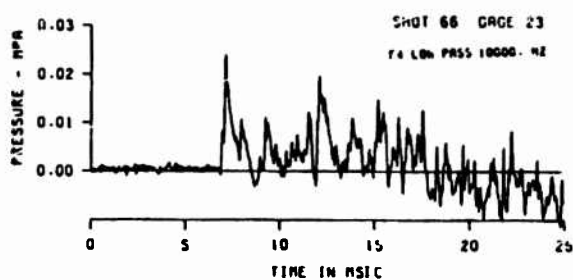
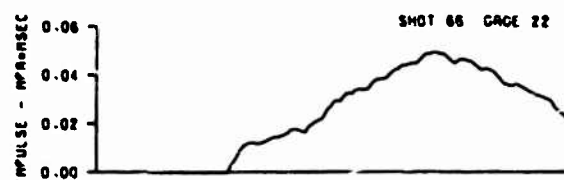
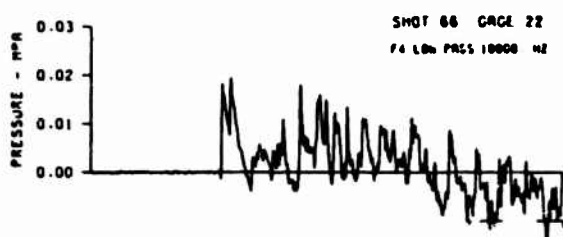
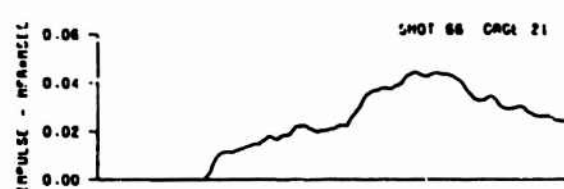
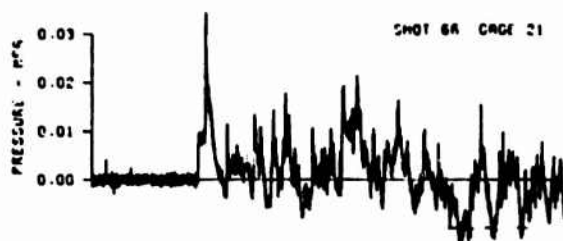
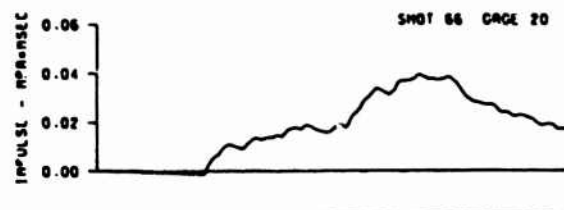
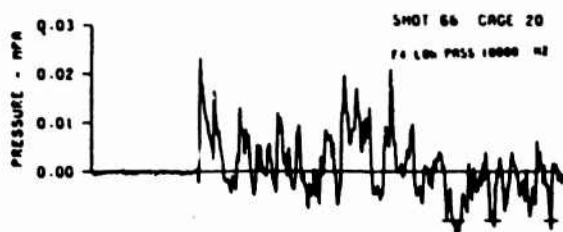
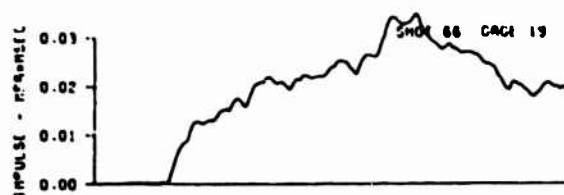
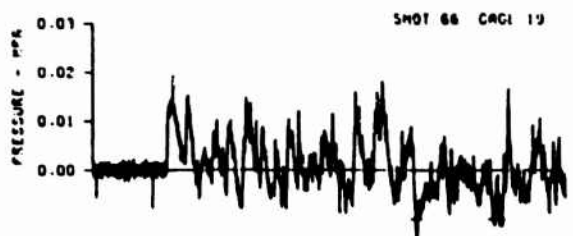


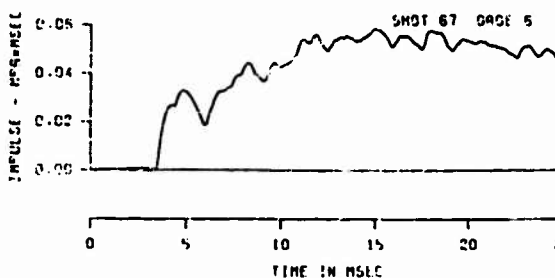
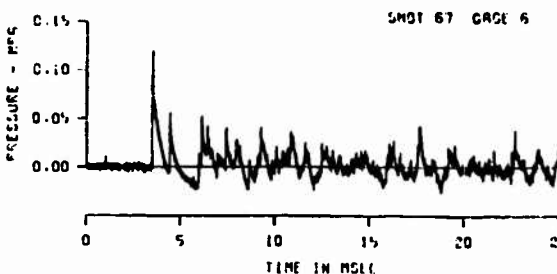
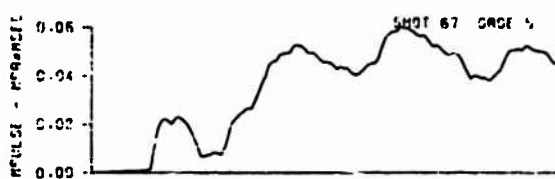
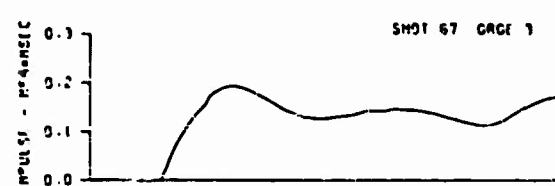
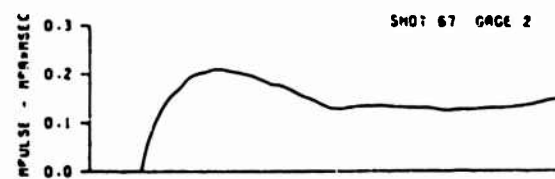
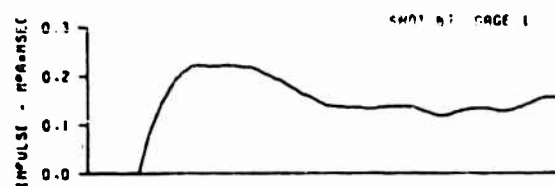
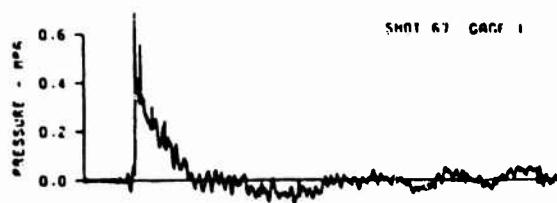


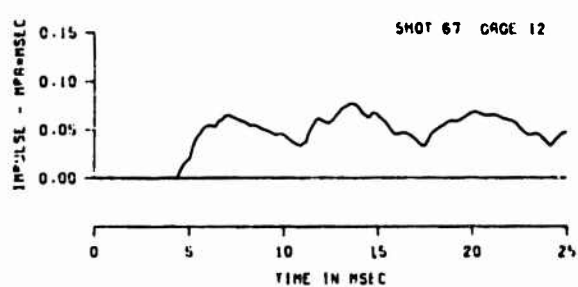
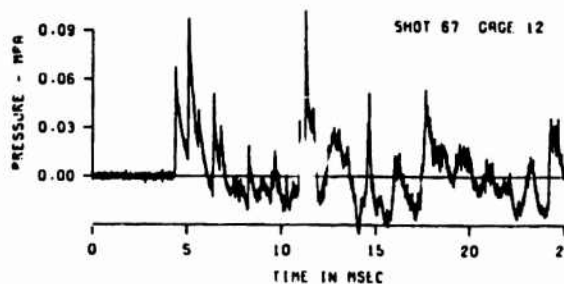
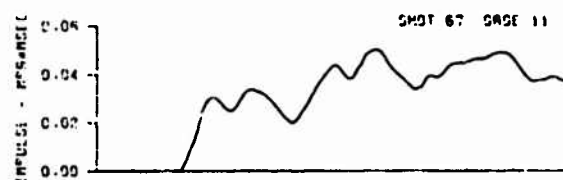
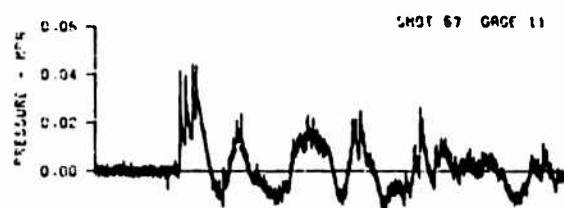
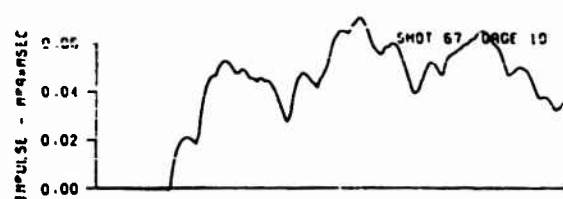
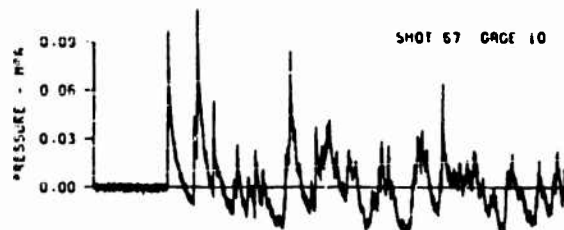
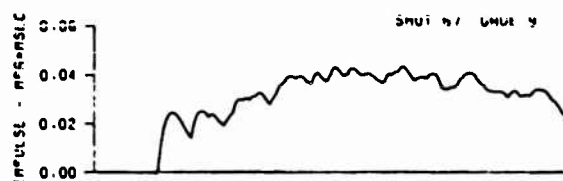
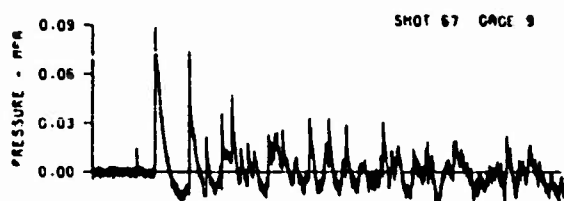
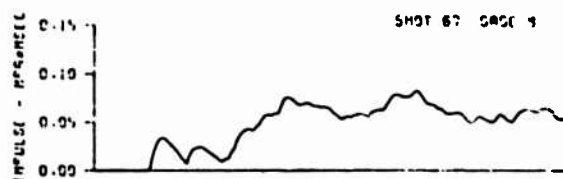
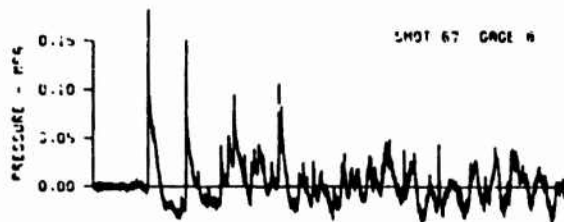
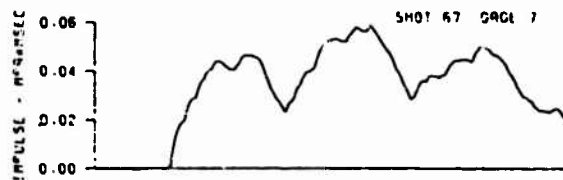


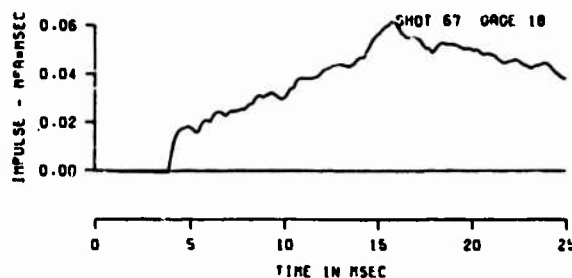
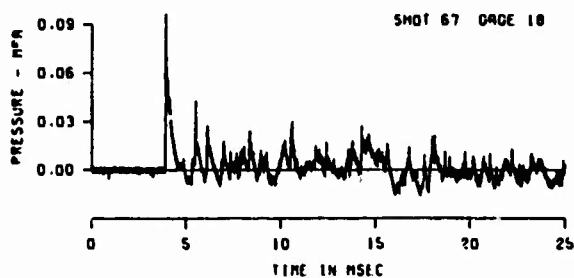
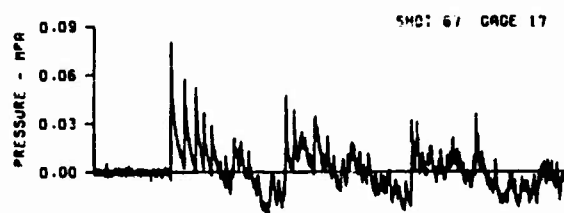
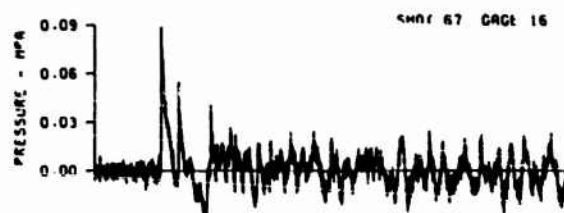
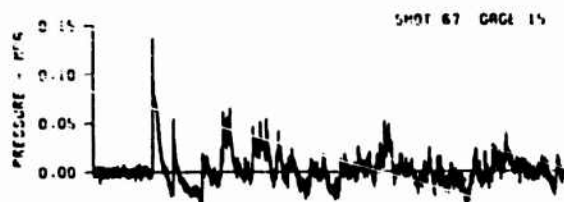
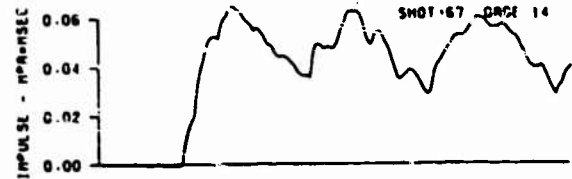
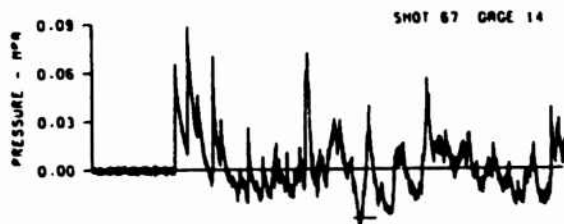
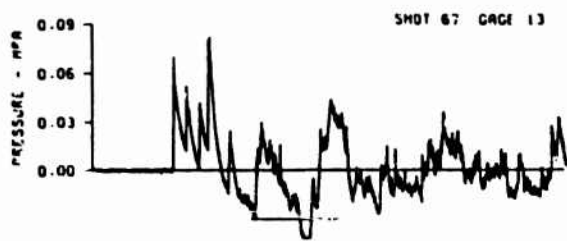


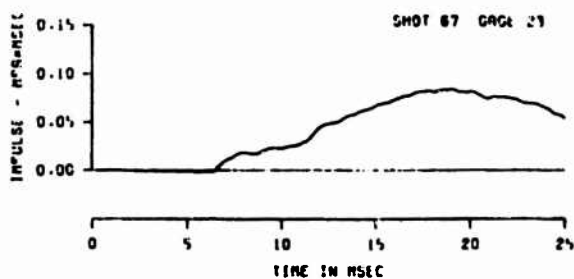
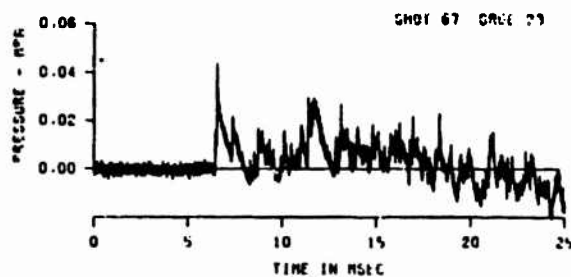
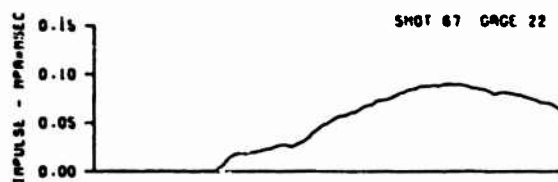
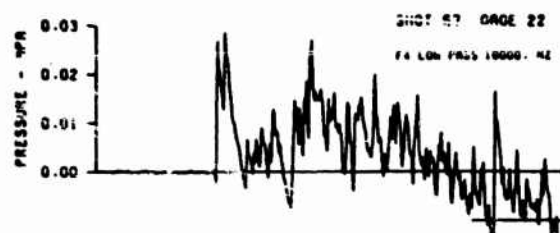
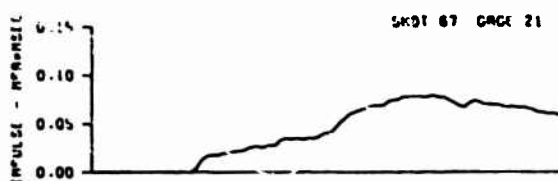
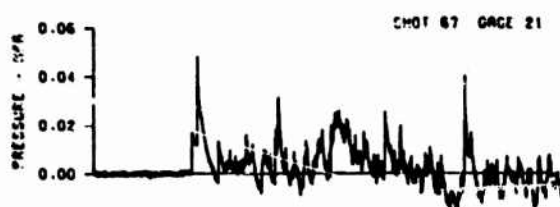
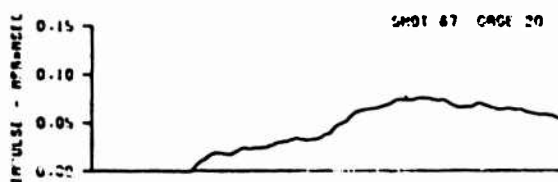
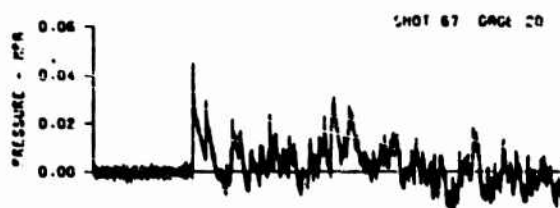
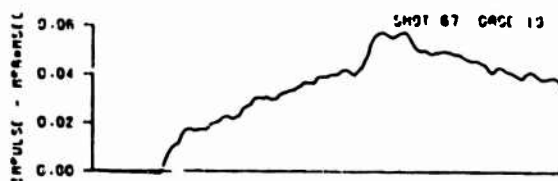
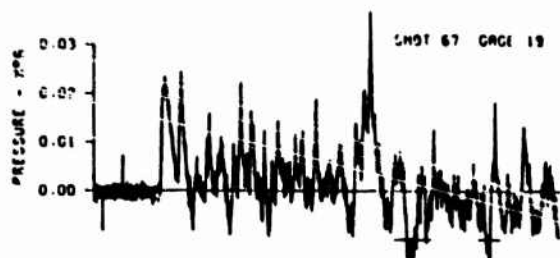


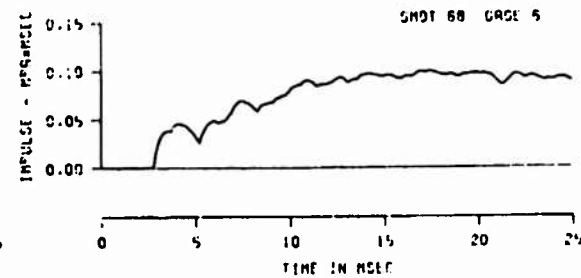
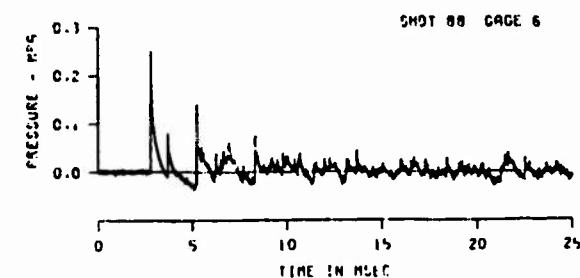
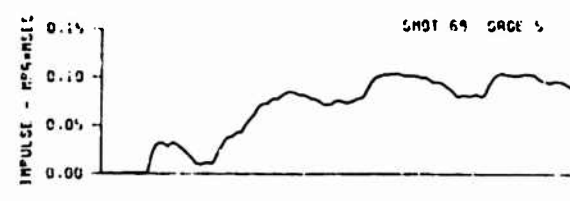
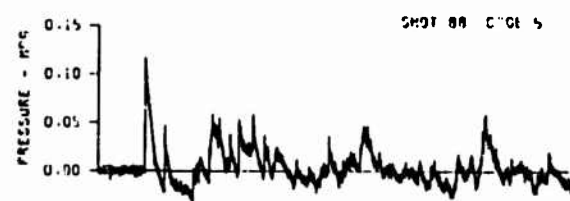
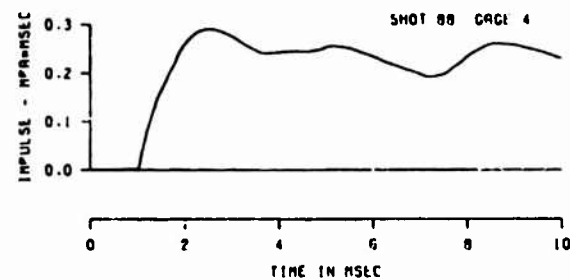
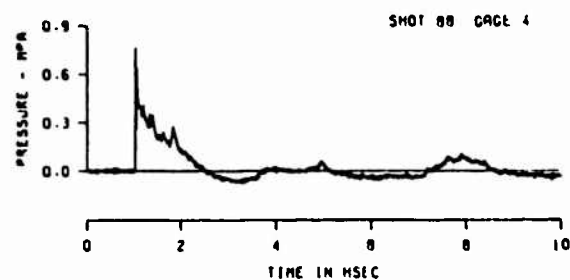
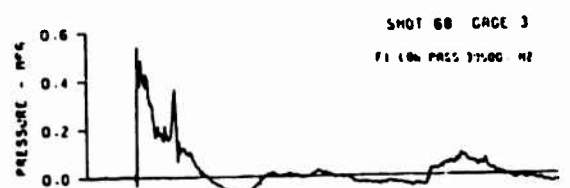
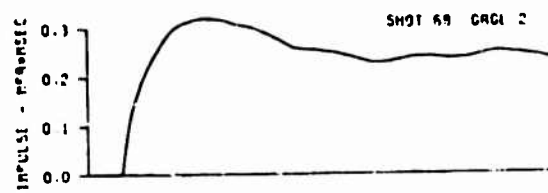
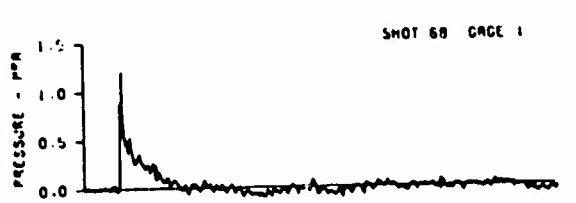




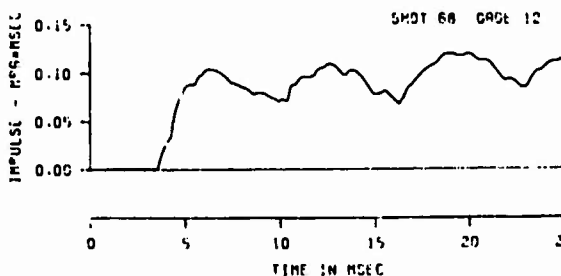
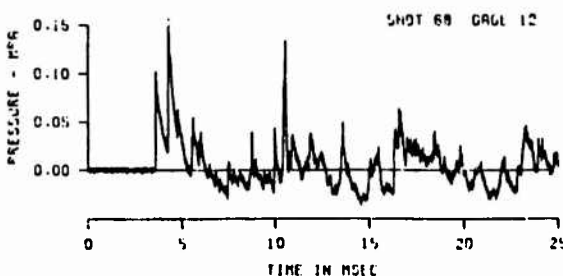
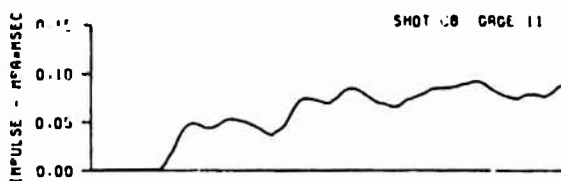
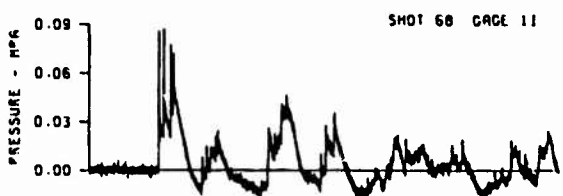
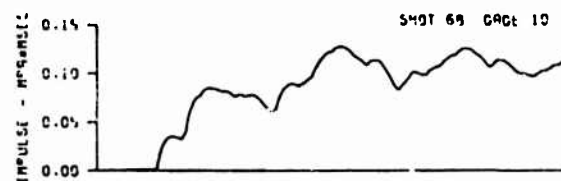
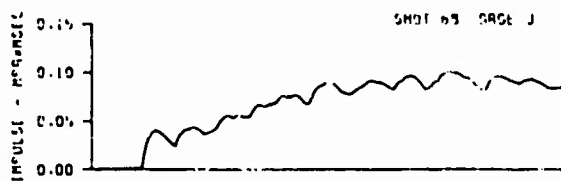
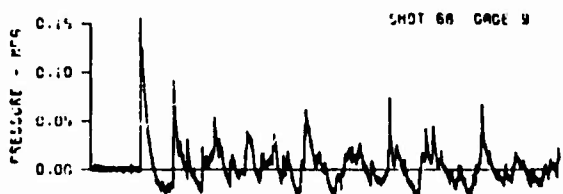
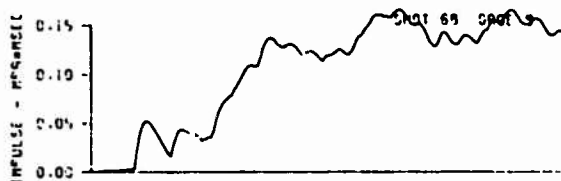
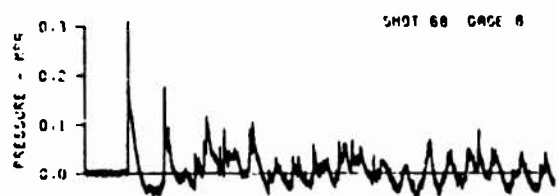
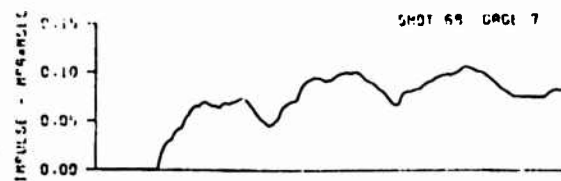
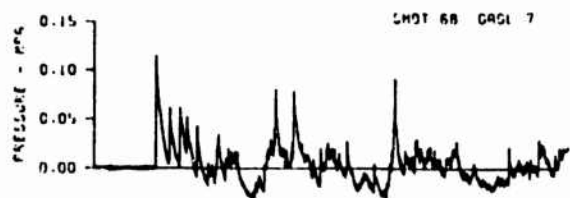


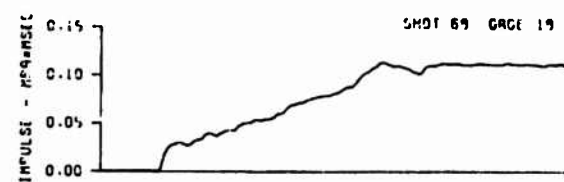
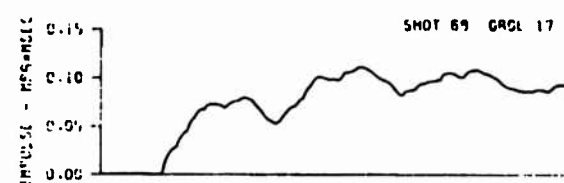
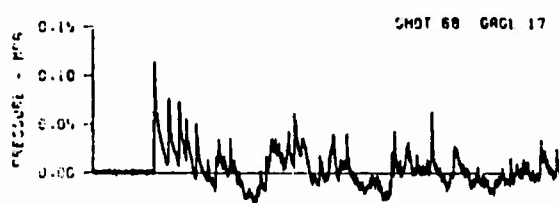
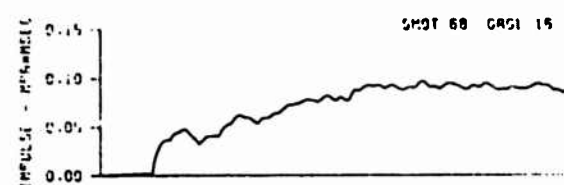
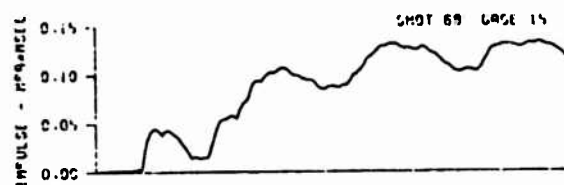
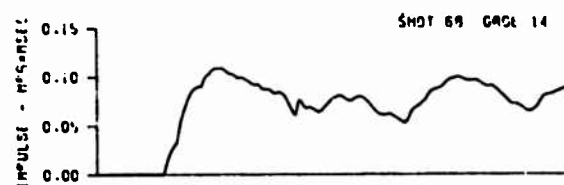
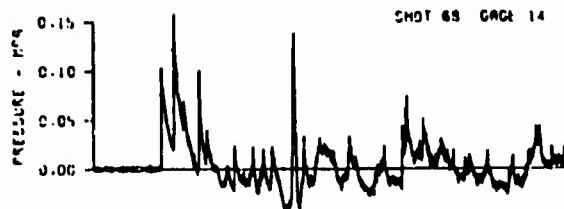
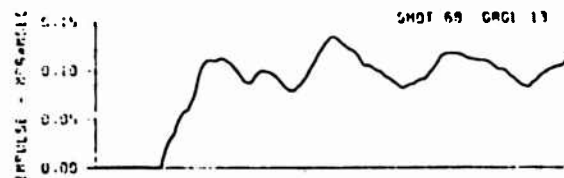
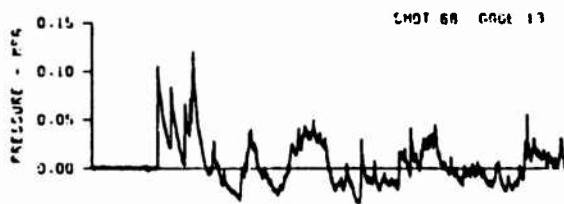






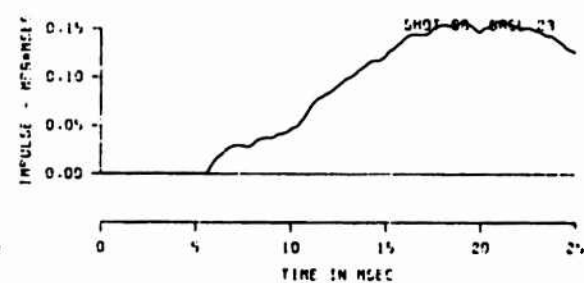
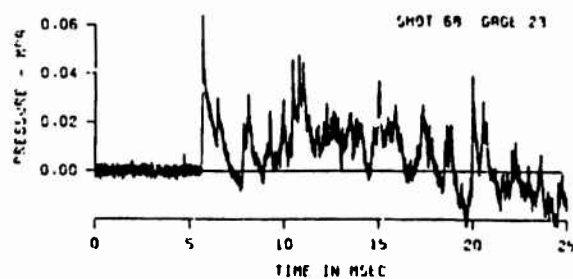
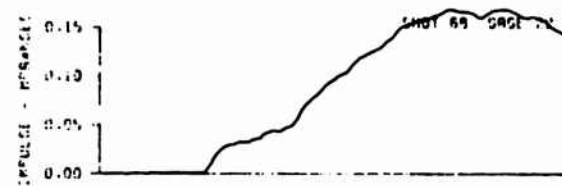
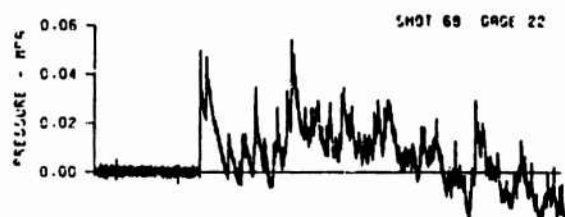
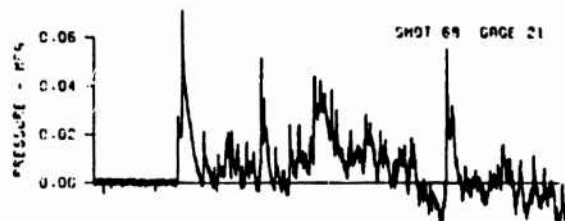
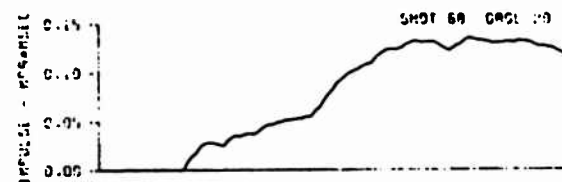
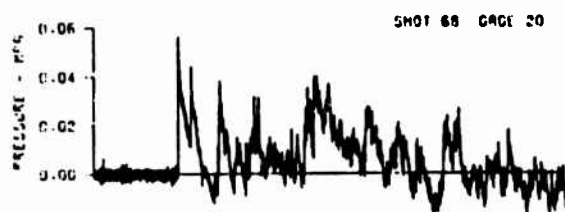
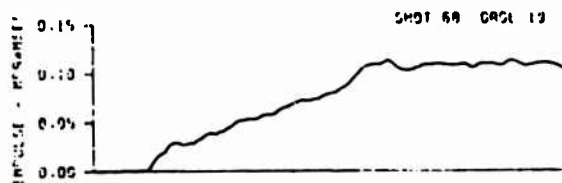
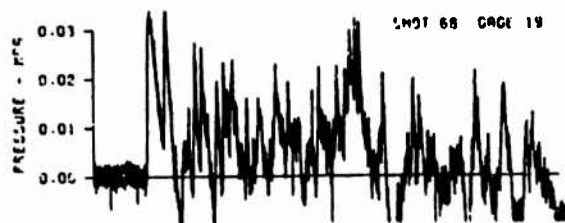


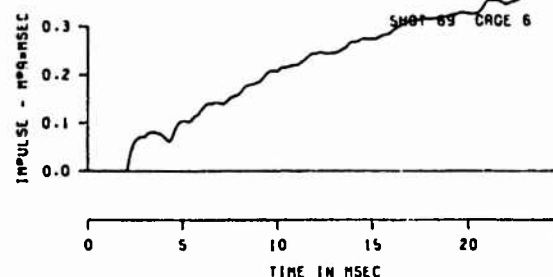
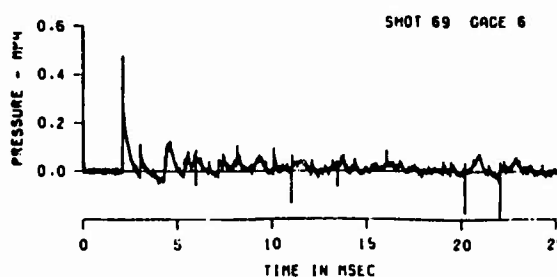
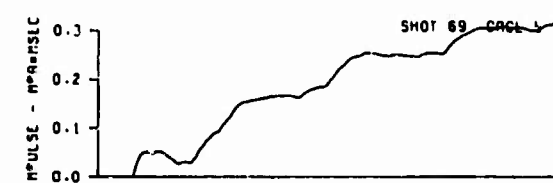
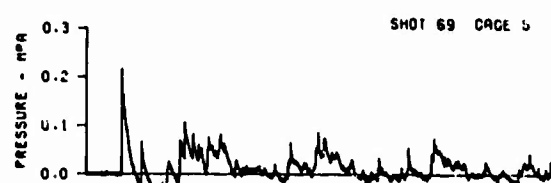
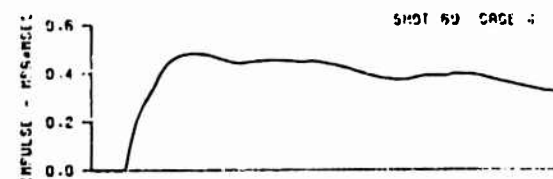
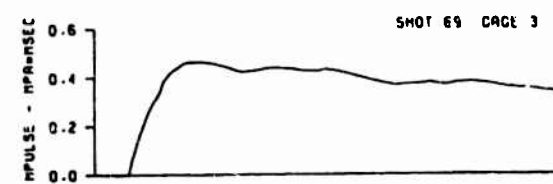
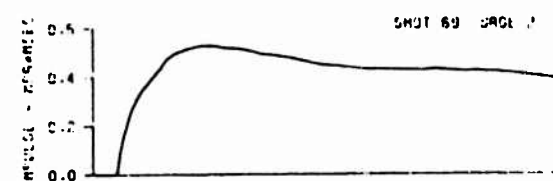
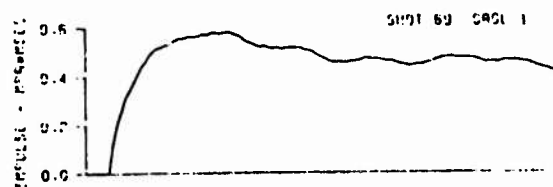


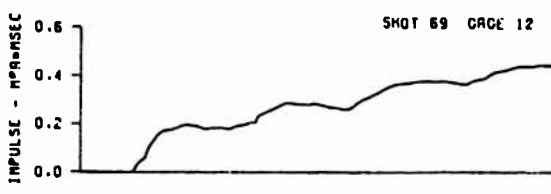
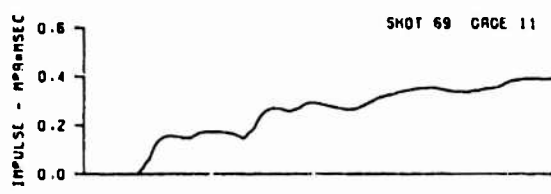
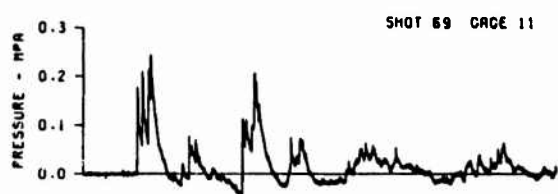
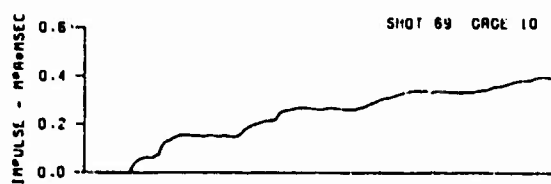
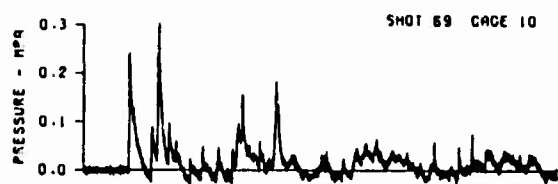
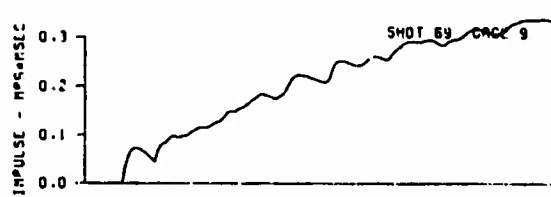
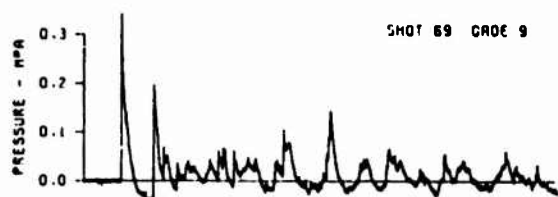
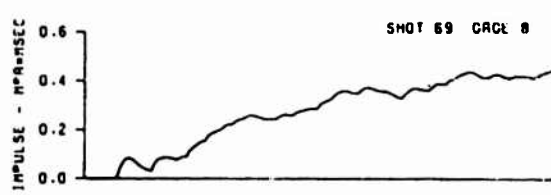
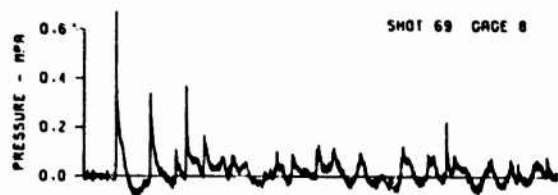
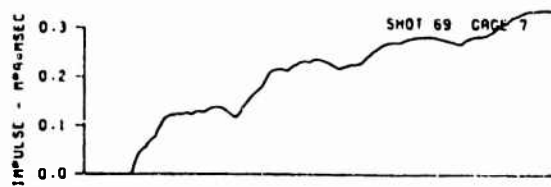
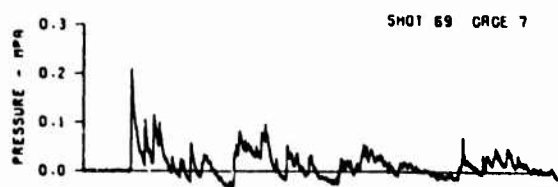


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TIME IN MSEC

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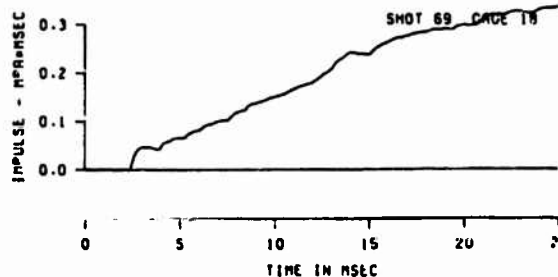
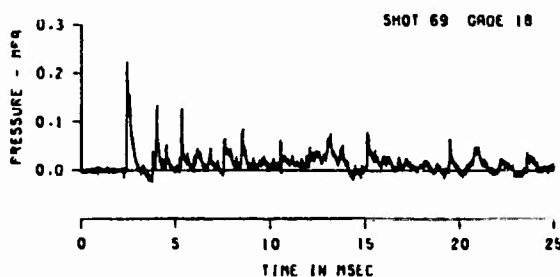
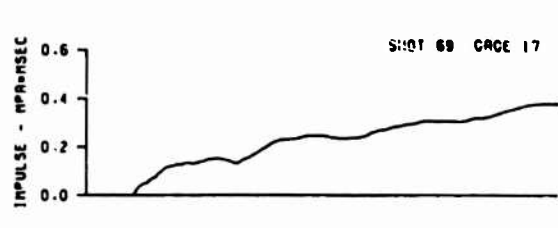
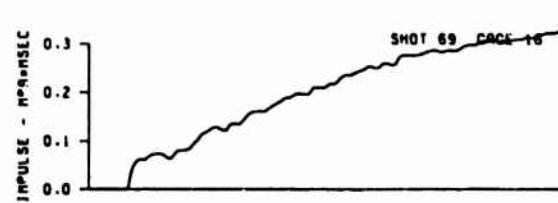
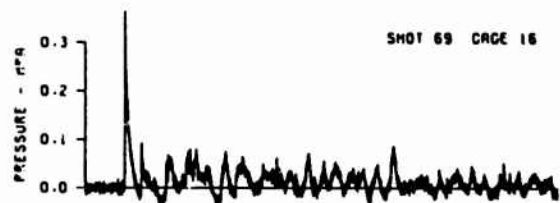
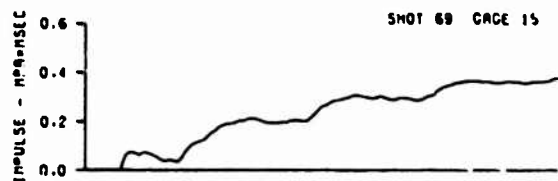
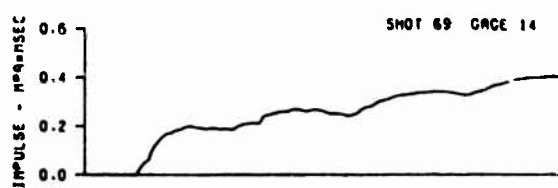
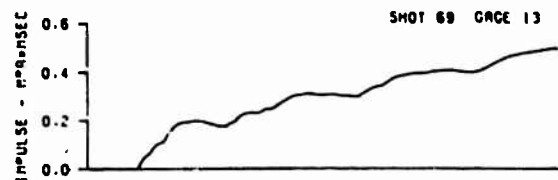
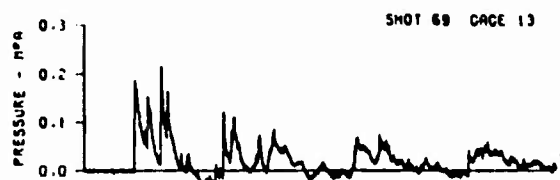


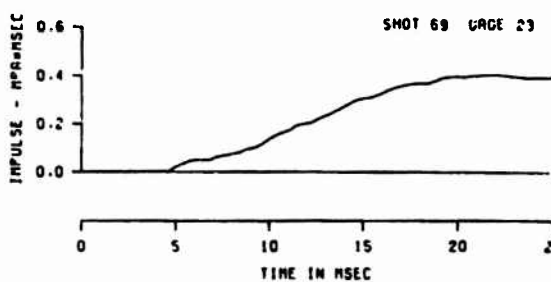
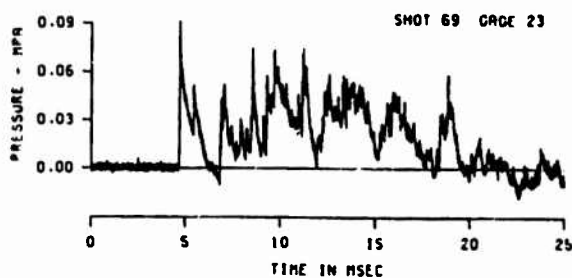
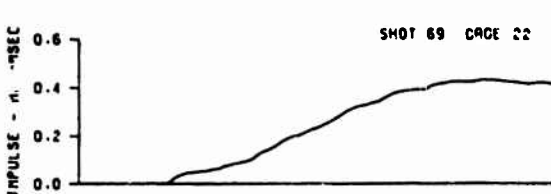
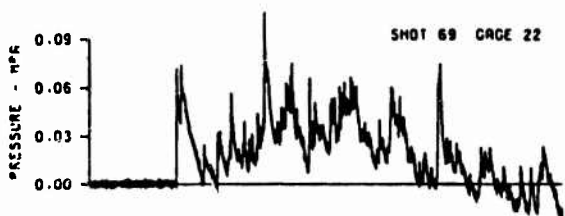
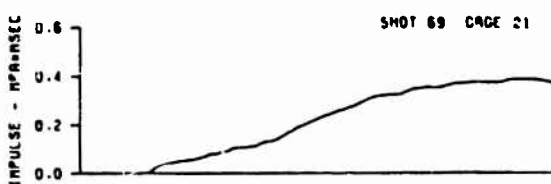
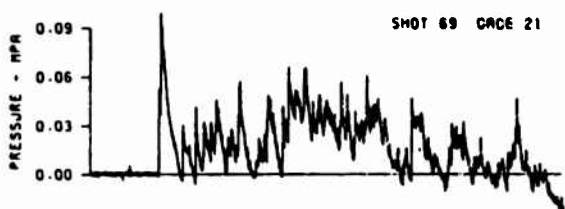
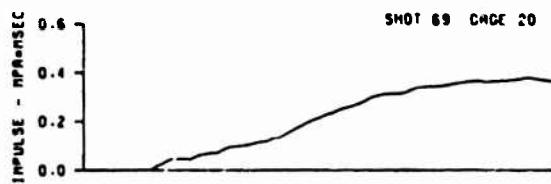
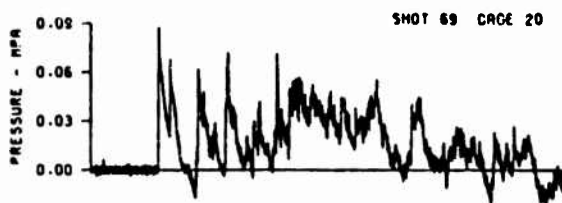
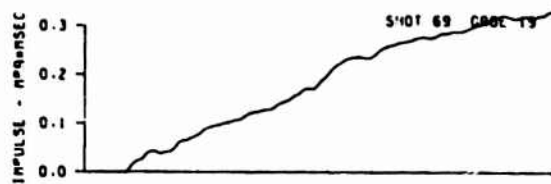
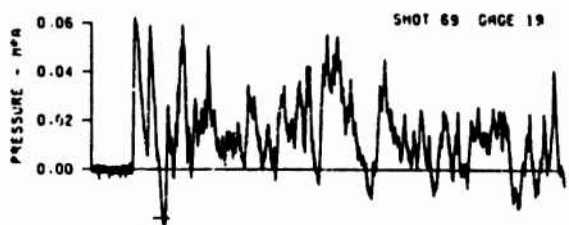


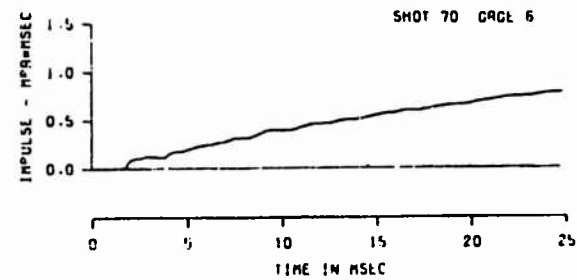
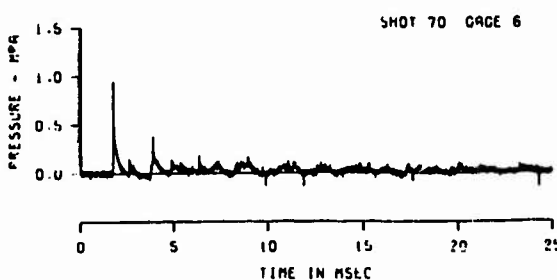
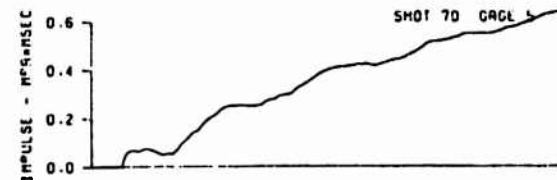
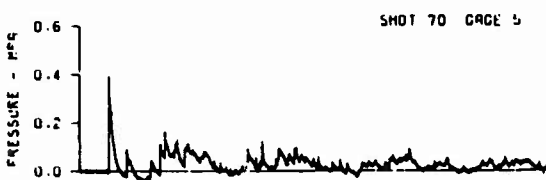
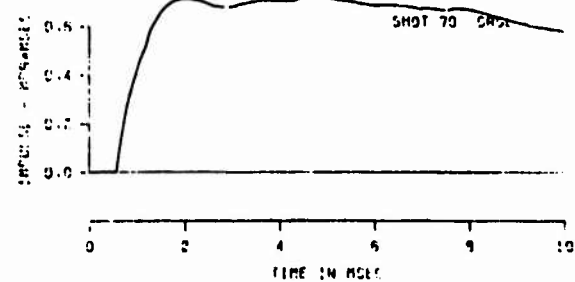
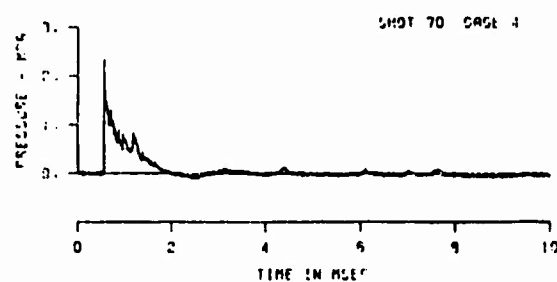
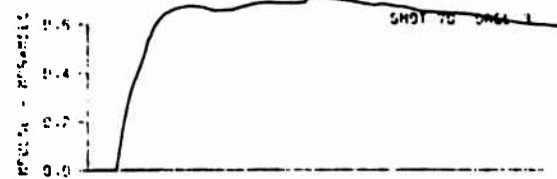
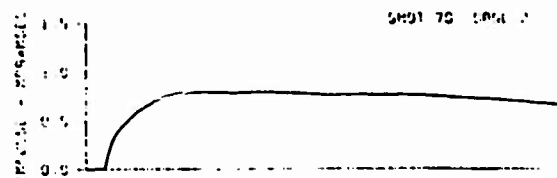
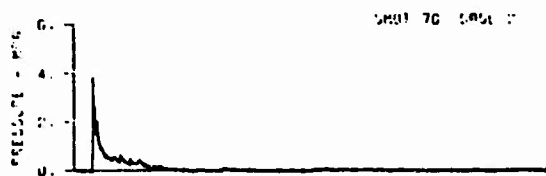
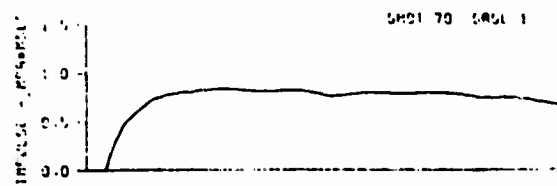


0 5 10 15 20 25  
TIME IN MSEC

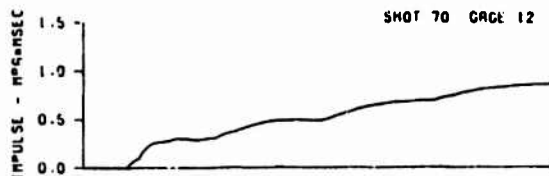
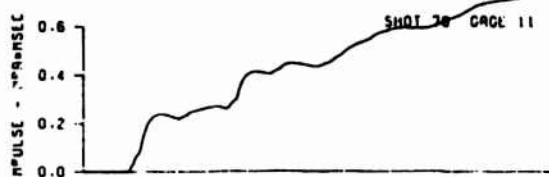
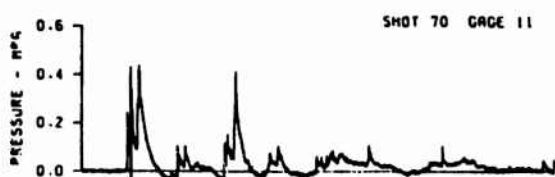
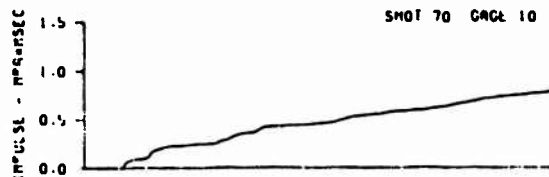
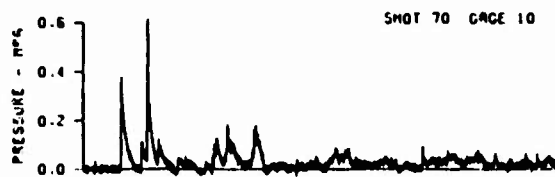
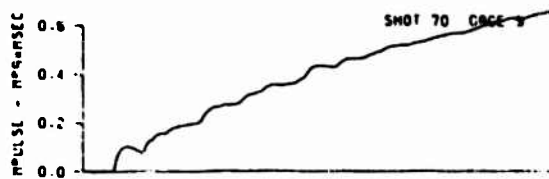
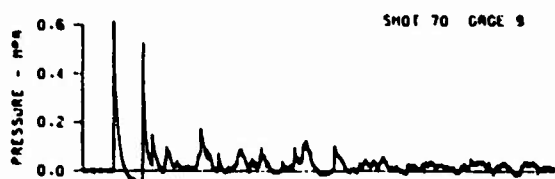
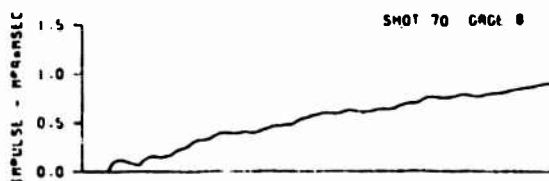
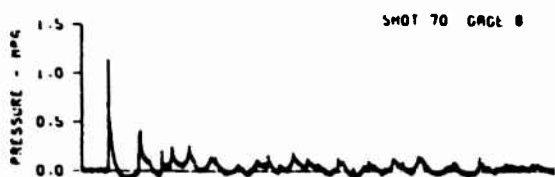
0 5 10 15 20 25  
TIME IN MSEC





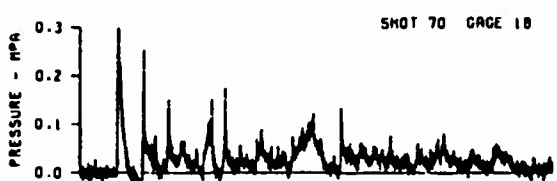
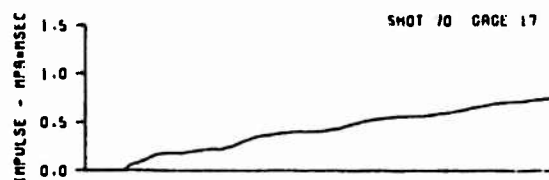
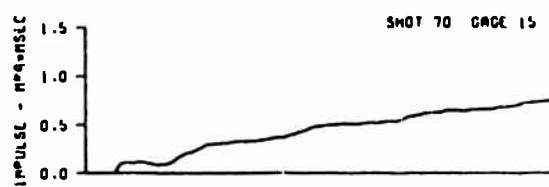
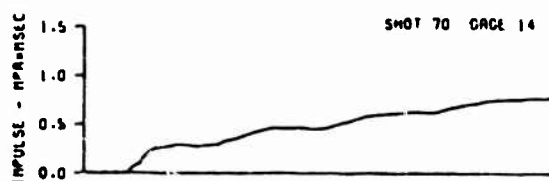
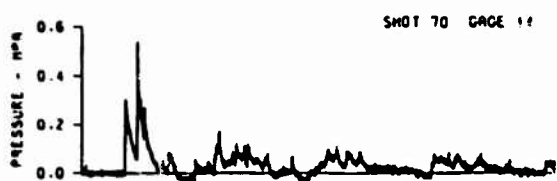
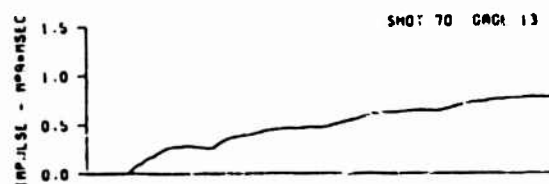
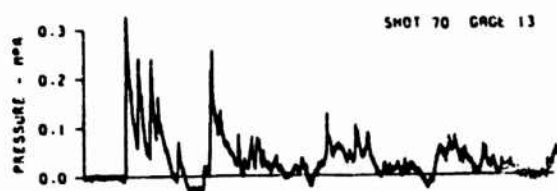


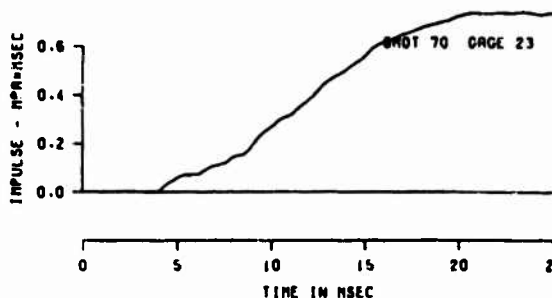
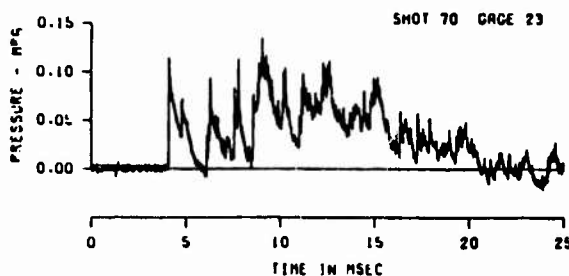
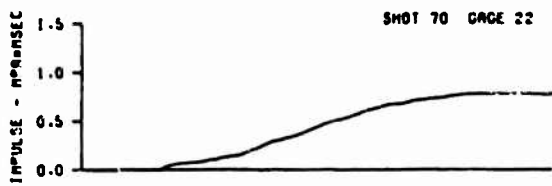
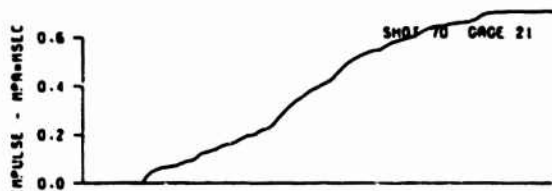
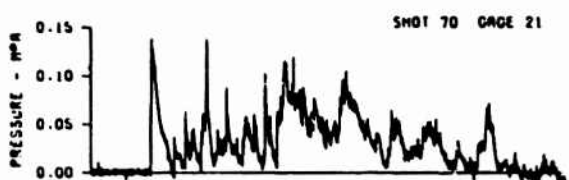
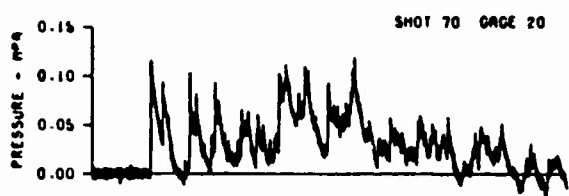
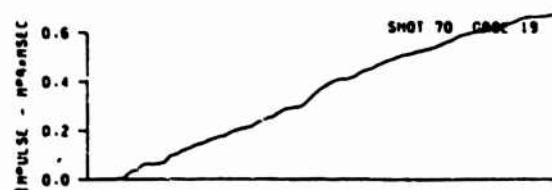
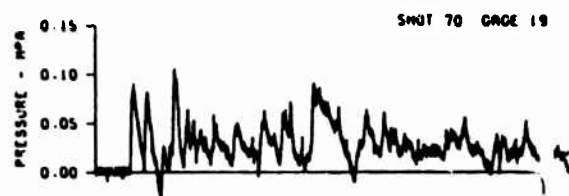


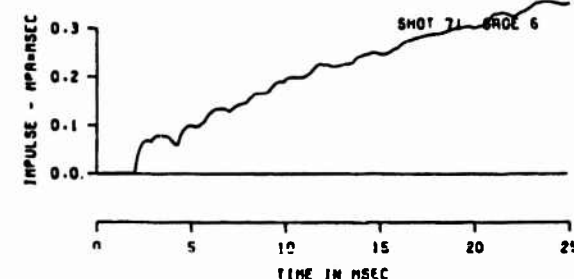
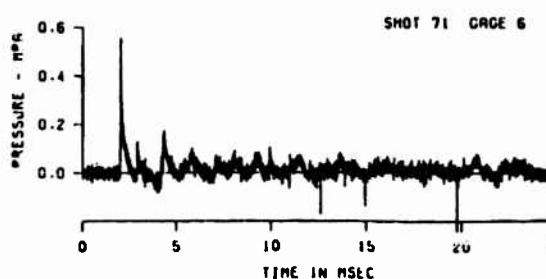
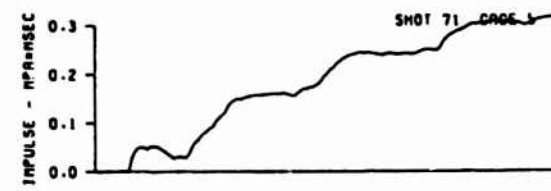
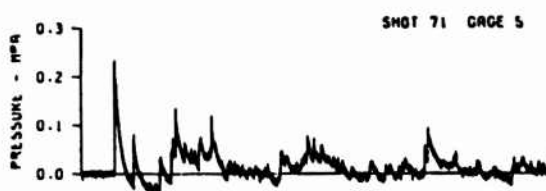
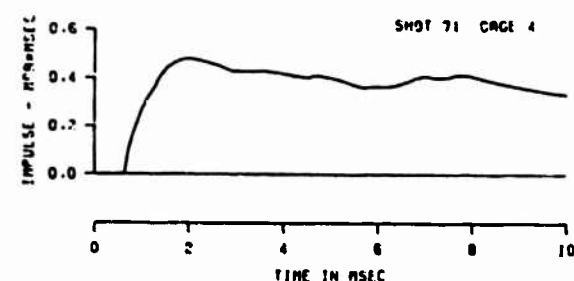
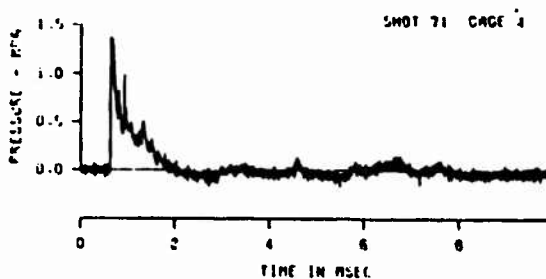
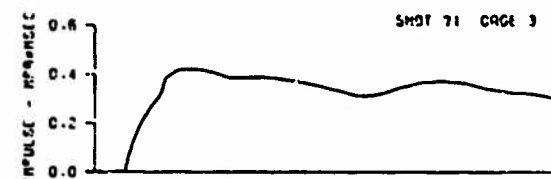
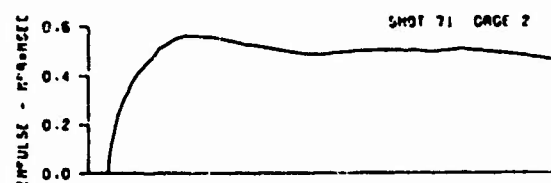


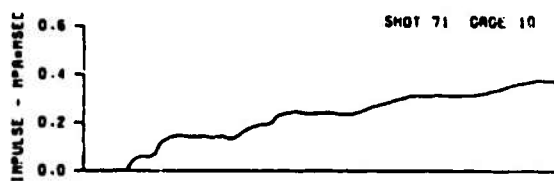
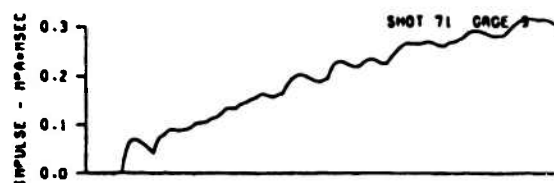
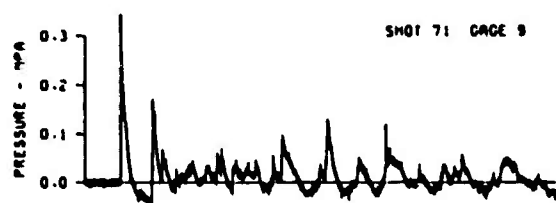
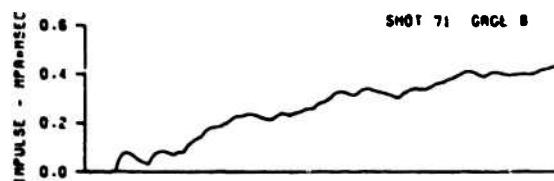
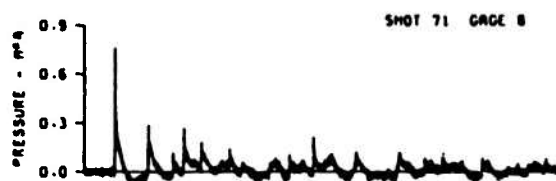
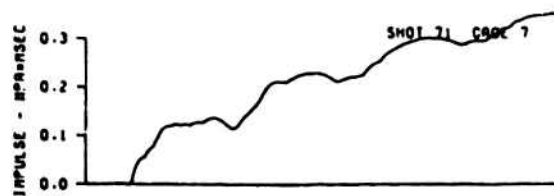
0 5 10 15 20 25  
TIME IN MSEC

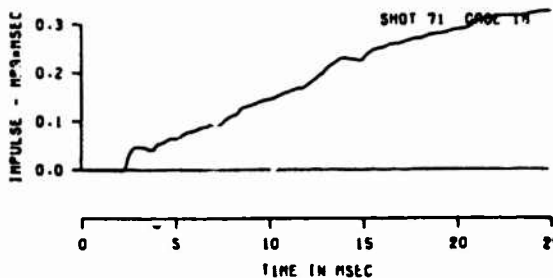
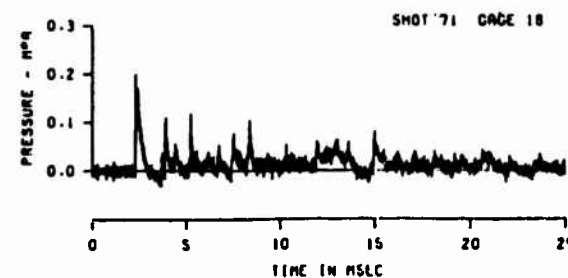
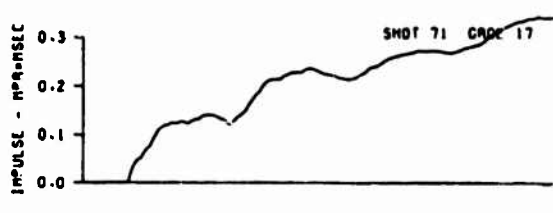
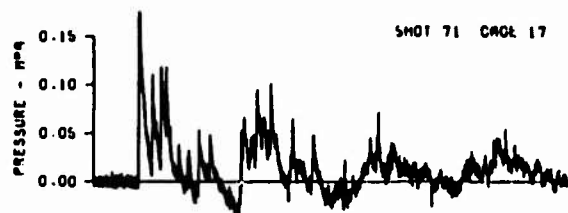
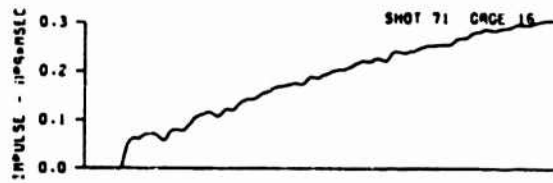
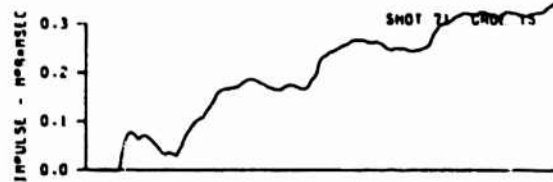
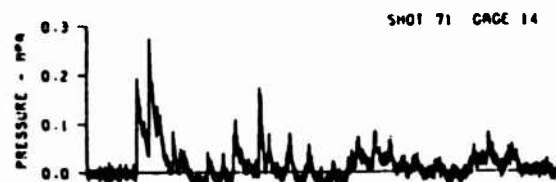
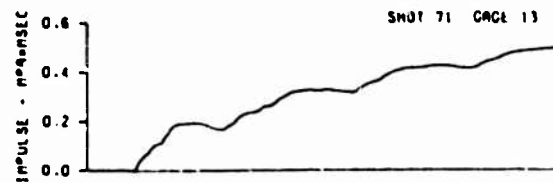
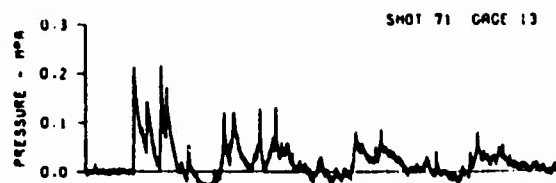
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TIME IN MSEC

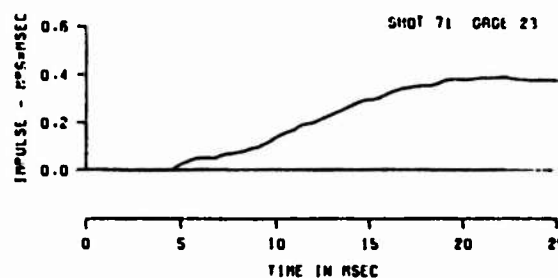
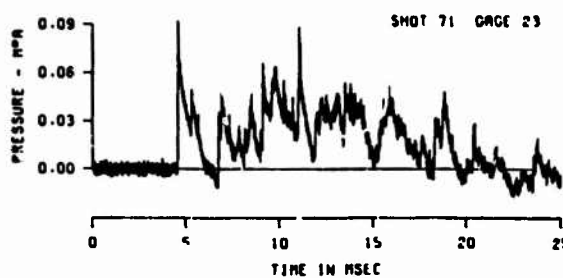
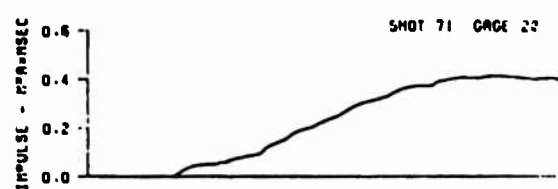
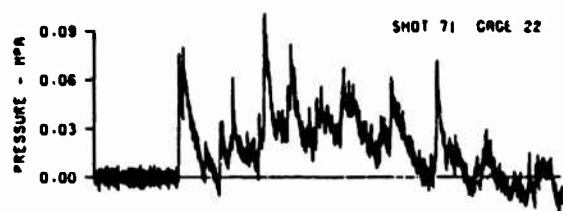
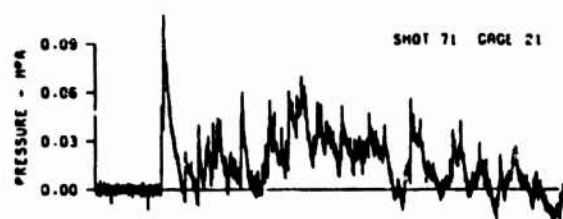
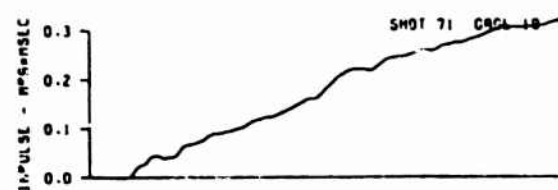












## APPENDIX C

### PEAK PRESSURES AND IMPULSES AND CHARACTERISTIC TIMES OF 1981 SERIES



- Airblast Penetration 1981 -

Shot 1

08-SEP-82 10:54:41

gauge no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, T <sub>00</sub> (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.27	0.11	1.09	2.85	0.38	--	--	--
2	--	--	--	--	--	--	--	--
3	0.20	0.07	--	1.04	--	--	--	--
4	0.20	0.07	4.20	0.89	0.31	--	--	--
5	0.30	0.10	2.20	2.24	0.30	--	--	--
6	0.42	0.18	--	0.64	--	--	--	--
7	0.25	0.04	2.80	0.87	0.28	--	--	--
8	0.24	0.08	2.96	0.53	0.18	--	--	--
9	0.36	0.11	1.53	1.35	0.10	--	--	--
10	--	--	--	--	--	--	--	--
11	--	--	--	--	--	--	--	--
12	--	--	--	--	--	--	--	--
13	0.53	0.09	0.99	0.61	0.11	--	--	--
14	0.68	0.35	1.95	0.54	0.13	--	--	--
15	--	--	--	--	--	--	--	--
16	0.62	0.13	2.23	0.71	0.16	--	--	--
17	--	--	--	--	--	--	--	--
18	1.16	0.16	2.62	0.41	0.18	--	--	--
19	--	--	--	--	--	--	--	--
20	--	--	--	--	--	--	--	--
21	--	--	--	--	--	--	--	--

- Airblast Penetration 1981 -

Shot 1

08-SEP-82 10:55:13

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
22	--	--	--	--	--	--	--	--
23	--	--	--	--	--	--	--	--
24	2.58	0.70	3.52	0.18	0.14	--	--	--
25	5.76	1.99	5.41	0.08	0.18	--	--	--
26	5.78	1.60	4.47	0.10	0.16	--	--	--
27	8.63	2.30	5.05	0.04	0.06	--	--	--
28	8.62	2.42	6.08	0.07	0.18	--	--	--
29	13.38	1.84	8.66	0.11	0.36	--	--	--
30	14.72	4.18	9.40	0.14	0.47	--	--	--
31	0.26	0.10	1.47	2.52	0.21	--	--	--
32	0.18	0.08	--	2.63	--	--	--	--
33	--	--	--	--	--	--	--	--
34	--	--	--	--	--	--	--	--
35	--	--	--	--	--	--	--	--
36	0.12	0.06	--	3.40	--	--	--	--

- Airblast Penetration 1981 -

Shot 2

08-SEP-82 10:55:48

gage no.	First Pulse				Second Pulse			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.30	0.10	1.32	1.67	0.23	--	--	--
2	--	--	--	--	--	--	--	--
3	0.31	0.14	1.20	1.18	0.21	--	--	--
4	0.26	0.15	--	1.18	--	--	--	--
5	0.33	0.16	1.18	1.08	0.21	--	--	--
6	0.31	0.14	1.27	1.79	0.25	--	--	--
7	0.32	0.13	1.09	1.04	0.20	--	--	--
8	0.27	0.15	1.02	1.04	0.20	--	--	--
9	0.40	0.22	1.38	0.82	0.21	--	--	--
10	0.30	0.25	1.18	1.19	0.28	--	--	--
11	0.40	0.18	1.18	0.88	0.21	--	--	--
12	0.35	0.09	1.02	0.83	0.11	--	--	--
13	0.57	0.29	1.37	0.73	0.25	--	--	--
14	--	--	--	--	--	--	--	--
15	0.60	0.13	1.12	1.12	0.19	--	--	--
16	0.55	0.47	1.53	0.48	0.22	--	--	--
17	--	--	--	--	--	--	--	--
18	0.85	0.25	1.84	0.62	0.21	--	--	--
19	0.84	0.34	1.61	0.55	0.22	--	--	--
20	0.85	0.35	1.65	0.42	0.18	--	--	--
21	2.13	0.49	2.65	0.31	0.25	--	--	--

- Airblast Penetration 1981 -

Shot 2

08-SEP-82 10:56:10

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
22	2.18	0.60	2.92	0.28	0.22	--	--	--
23	--	--	--	--	--	--	--	--
24	2.18	1.00	2.92	0.25	0.22	--	--	--
25	4.70	1.85	4.40	0.18	0.24	21.65	0.07	--
26	4.70	1.42	4.92	0.18	0.26	21.68	0.07	--
27	7.10	2.50	6.25	0.16	0.34	18.90	0.07	--
28	7.10	1.65	6.12	0.13	0.24	18.95	0.06	--
29	11.35	2.45	--	0.19	--	14.15	0.13	--
30	12.52	2.43	9.78	0.26	0.73	--	--	--
31	--	--	--	--	--	--	--	--
32	--	--	--	--	--	--	--	--
33	--	--	--	--	--	--	--	--
34	0.22	0.12	0.78	3.50	0.46	--	--	--
35	--	--	--	--	--	--	--	--
36	--	--	--	--	--	--	--	--

- Airblast Penetration 1981 -

Shot 3

08-SEP-82 10:56:50

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa) msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa) msec)
1	0.10	0.37	0.30	5.40	0.36	--	--	--
2	--	--	--	--	--	--	--	--
3	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--	--
5	--	--	--	--	--	--	--	--
6	--	--	--	--	--	--	--	--
7	--	--	--	--	--	--	--	--
8	--	--	--	--	--	--	--	--
9	--	--	--	--	--	--	--	--
10	--	--	--	--	--	--	--	--
11	1.22	0.41	2.18	0.38	0.16	--	--	--
12	--	--	--	--	--	--	--	--
13	--	--	--	--	--	--	--	--
14	1.40	0.68	1.98	0.81	0.17	--	--	--
15	--	--	--	--	--	--	--	--
16	--	--	--	--	--	--	--	--
17	--	--	--	--	--	--	--	--
18	2.37	0.18	2.63	0.50	0.19	--	--	--
19	--	--	--	--	--	--	--	--
20	--	--	--	0.25	0.14	--	--	--
21	--	--	--	--	--	--	--	--

- Airblast Penetration 1981 -

Shot 3

08-SEP-82 10:57:10

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa) msec	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa) msec
22	2.57	0.59	3.33	0.24	0.18	--	--	--
23	--	--	--	--	--	--	--	--
24	2.52	0.58	3.51	0.20	0.17	--	--	--
25	5.62	1.56	4.36	0.10	0.15	--	--	--
26	5.60	1.56	4.52	0.10	0.17	--	--	--
27	8.36	3.09	6.76	0.09	0.28	24.15	0.07	--
28	8.35	2.35	5.85	0.08	0.17	21.20	0.07	--
29	13.00	2.10	--	0.07	--	21.25	0.04	--
30	14.45	3.50	8.60	0.13	0.41	16.20	0.05	--
31	--	--	--	--	--	--	--	--
32	--	--	--	--	--	--	--	--
33	--	--	--	--	--	--	--	--
34	0.55	0.13	1.62	2.34	0.24	--	--	--
35	1.20	--	--	3.10	--	--	--	--
36	1.18	--	--	1.70	--	--	--	--

- Airblast Penetration 1981 -

Shot 4

08-SEP-82 10:57:50

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.52	0.26	1.68	0.64	0.20	--	--	--
2	0.49	0.29	3.12	0.52	0.33	--	--	--
3	0.53	0.22	1.55	0.62	0.17	--	--	--
4	0.46	0.24	2.69	0.52	0.24	--	--	--
5	0.57	0.28	1.25	0.52	0.14	--	--	--
6	0.53	0.29	1.25	0.42	0.14	--	--	--
7	0.57	0.31	1.12	0.45	0.13	--	--	--
8	0.52	0.18	1.18	0.40	0.10	--	--	--
9	0.68	0.27	1.32	0.52	0.15	--	--	--
10	--	--	--	--	--	--	--	--
11	0.68	0.38	1.32	0.41	0.13	--	--	--
12	0.65	0.15	1.05	0.26	0.05	--	--	--
13	0.92	0.34	1.58	0.42	0.18	--	--	--
14	0.92	0.20	1.28	0.38	0.12	--	--	--
15	0.93	0.35	0.99	0.33	0.07	--	--	--
16	0.93	0.25	1.40	0.40	0.13	--	--	--
17	--	--	--	--	--	--	--	--
18	1.51	0.29	1.81	0.35	0.15	--	--	--
19	--	--	--	--	--	--	--	--
20	1.50	0.70	1.80	0.24	0.14	--	--	--
21	2.80	0.95	2.76	0.22	0.18	--	--	--

- Airblast Penetration 1981 -

Shot 4

08-SEP-82 10:58:19

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
22	2.80	0.82	3.00	0.18	0.17	--	--	--
23	--	--	--	--	--	--	--	--
24	2.78	0.90	3.02	0.18	0.17	--	--	--
25	5.82	1.43	4.78	0.12	0.16	23.95	0.04	--
26	5.80	1.52	4.20	0.12	0.17	24.00	0.04	--
27	8.45	2.23	5.75	0.11	0.25	20.92	0.05	--
28	8.42	1.48	5.30	0.10	0.16	20.95	0.05	--
29	13.00	2.80	--	0.08	--	16.05	0.08	--
30	14.32	1.98	7.98	0.22	0.43	--	--	--
31	0.49	0.17	1.09	2.55	0.29	--	--	--
32	--	--	--	--	--	--	--	--
33	--	--	--	--	--	--	--	--
34	0.44	0.16	0.96	1.80	0.26	--	--	--
35	0.50	0.18	0.95	2.70	0.30	--	--	--
36	--	--	--	--	--	--	--	--



- Airblast Penetration 1981 -

Shot 5

08-SEP-82 10:58:53

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa) msec	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa) msec
1	0.72	0.30	2.64	0.66	0.27	--	--	--
2	--	--	--	--	--	--	--	--
3	0.82	0.18	1.98	0.78	0.18	--	--	--
4	0.53	0.25	4.32	0.28	0.15	--	--	--
5	0.74	0.18	1.84	0.60	0.15	--	--	--
6	--	--	--	--	--	--	--	--
7	0.87	0.21	1.69	0.74	0.15	--	--	--
8	0.61	0.12	1.79	0.37	0.05	--	--	--
9	0.85	0.20	2.13	0.36	0.11	--	--	--
10	--	--	--	--	--	--	--	--
11	0.96	0.25	1.86	0.42	0.11	--	--	--
12	0.80	0.21	1.10	0.09	0.03	--	--	--
13	--	--	--	0.18	0.02	--	--	--
14	1.23	0.41	2.41	0.37	0.11	--	--	--
15	--	--	--	--	--	--	--	--
16	1.18	0.70	2.08	0.15	0.09	--	--	--
17	--	--	--	--	--	--	--	--
18	1.95	0.69	2.53	0.14	0.12	--	--	--
19	--	--	--	--	--	--	--	--
20	2.01	0.29	2.37	0.25	0.11	--	--	--
21	3.52	1.24	3.48	0.11	0.15	--	--	--

- Airblast Penetration 1981 -

Shot 5

08-SEP-82 10:59:21

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
22	3.50	1.05	2.78	0.11	0.11	--	--	--
23	--	--	--	--	--	--	--	--
24	3.53	1.27	3.02	0.10	0.13	--	--	--
25	--	--	--	--	--	--	--	--
26	6.94	1.81	3.68	0.07	0.12	--	--	--
27	9.88	2.24	5.17	0.08	0.18	23.04	0.05	--
28	9.90	2.00	5.30	0.06	0.11	23.10	0.03	--
29	14.86	3.04	--	0.05	--	18.03	0.06	--
30	16.30	1.52	6.95	0.12	0.26	--	--	--
31	0.72	0.38	1.91	0.97	0.45	--	--	--
32	--	--	--	--	--	--	--	--
33	--	--	--	--	--	--	--	--
34	0.48	0.29	2.02	0.83	0.23	--	--	--
35	--	--	--	--	--	--	--	--
36	--	--	--	--	--	--	--	--

- Airblast Penetration 1981 -

Shot 6

08-SEP-82 10:59:51

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.21	0.17	2.35	1.60	0.26	--	--	--
2	--	--	--	--	--	--	--	--
3	0.18	0.14	2.35	1.30	0.24	--	--	--
4	0.08	0.10	--	0.42	--	--	--	--
5	0.22	0.17	2.10	1.03	0.18	--	--	--
6	--	--	--	0.35	0.08	--	--	--
7	0.20	0.19	2.00	0.86	0.18	--	--	--
8	0.13	0.12	2.07	0.52	0.07	--	--	--
9	0.28	0.23	2.05	0.53	0.14	--	--	--
10	--	--	--	--	--	--	--	--
11	0.67	0.23	2.25	0.37	0.12	--	--	--
12	0.63	0.20	0.79	0.20	0.03	--	--	--
13	0.57	0.19	1.78	0.40	0.05	--	--	--
14	0.62	0.49	1.88	0.34	0.12	--	--	--
15	--	--	--	--	--	--	--	--
16	0.62	0.42	2.06	0.34	0.13	--	--	--
17	--	--	--	--	--	--	--	--
18	1.24	0.23	2.81	0.71	0.36	--	--	--
19	--	--	--	--	--	--	--	--
20	1.23	0.36	2.47	0.21	0.12	--	--	--
21	2.64	1.11	3.64	0.15	0.19	--	--	--

- Airblast Penetration 1981 -

Shot 6

08-SEP-82 11:00:20

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
22	2.58	1.07	2.95	0.12	0.14	--	--	--
23	--	--	--	--	--	--	--	--
24	2.65	1.00	3.15	0.13	0.15	--	--	--
25	5.88	1.42	5.12	0.08	0.15	--	--	--
26	5.82	1.90	4.48	0.09	0.14	--	--	--
27	8.71	3.79	5.71	0.07	0.20	--	--	--
28	8.68	2.32	5.77	0.07	0.15	21.68	0.06	--
29	13.52	2.98	--	0.05	--	21.65	0.04	--
30	15.00	2.78	7.70	0.12	0.34	16.62	0.06	--
31	0.57	0.23	0.98	1.38	0.28	--	--	--
32	0.32	0.14	0.57	1.23	0.15	--	--	--
33	--	--	--	--	--	--	--	--
34	0.36	0.16	0.53	2.00	0.23	--	--	--
35	0.43	0.12	2.37	1.65	0.40	--	--	--
36	--	--	--	--	--	--	--	--

-- Airblast Penetration 1981 -

Shot 7

08-SEP-82 11:00:50

gage no.	First Pulse				Second Pulse			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.90	0.25	2.38	0.29	0.11	--	--	--
2	0.88	0.23	3.18	0.34	0.29	--	--	--
3	0.90	0.38	1.45	0.24	0.11	--	--	--
4	0.89	0.26	--	0.30	--	--	--	--
5	0.96	0.28	1.36	0.27	0.10	--	--	--
6	0.95	0.36	1.35	0.24	0.09	--	--	--
7	0.97	0.33	1.23	0.27	0.10	--	--	--
8	0.96	0.23	1.29	0.27	0.06	--	--	--
9	1.10	0.36	1.58	0.26	0.10	--	--	--
10	--	--	--	--	--	--	--	--
11	1.13	0.35	1.19	0.23	0.10	--	--	--
12	1.12	0.11	1.20	0.19	0.02	--	--	--
13	1.44	0.58	1.66	0.21	0.15	--	--	--
14	1.43	0.60	1.53	0.19	0.10	--	--	--
15	1.45	0.45	1.85	0.22	0.15	--	--	--
16	1.43	0.41	1.62	0.20	0.11	--	--	--
17	--	--	--	--	--	--	--	--
18	2.12	0.46	2.21	0.17	0.12	--	--	--
19	--	--	--	--	--	--	--	--
20	2.13	0.84	2.12	0.15	0.11	--	--	--
21	3.62	1.06	2.90	0.14	0.14	--	--	--

- Airblast Penetration 1981 -

Shot 7

08-SEP-82 11:01:20

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
22	3.62	0.68	2.88	0.11	0.11	--	--	--
23	3.62	0.66	1.98	0.11	0.06	--	--	--
24	3.63	0.82	2.77	0.12	0.11	--	--	--
25	6.95	1.58	5.47	0.08	0.14	--	--	--
26	6.95	1.35	4.10	0.08	0.13	--	--	--
27	9.78	2.72	5.97	0.08	0.17	--	--	--
28	9.75	1.90	5.17	0.06	0.12	22.65	0.05	--
29	14.60	2.52	--	0.06	--	22.70	0.04	--
30	15.95	1.95	7.95	0.12	0.29	17.75	0.05	--
31	0.84	0.20	1.03	0.87	0.18	--	--	--
32	--	--	--	--	--	--	--	--
33	--	--	--	--	--	--	--	--
34	0.84	0.20	1.03	1.34	0.26	--	--	--
35	--	--	--	--	--	--	--	--
36	--	--	--	--	--	--	--	--

- Airblast Penetration 1981 -

Shot 8

08-SEP-82 11:01:51

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	IMax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	IMax (MPa- msec)
1	0.30	0.10	0.49	0.50	0.36	--	--	--
2	--	--	--	--	--	--	--	--
3	0.26	0.12	0.46	3.45	0.24	--	--	--
4	--	--	--	--	--	--	--	--
5	0.30	0.14	0.40	2.80	0.22	--	--	--
6	--	--	--	--	--	--	--	--
7	0.28	0.11	0.42	1.79	0.17	--	--	--
8	0.22	0.06	0.16	0.70	0.08	--	--	--
9	0.36	0.16	0.37	0.90	0.11	--	--	--
10	--	--	--	--	--	--	--	--
11	0.35	0.15	0.95	0.64	0.13	--	--	--
12	--	--	--	0.72	--	--	--	--
13	--	--	--	0.62	--	--	--	--
14	0.65	0.23	1.11	0.71	0.15	--	--	--
15	--	--	--	--	--	--	--	--
16	0.64	0.24	2.22	0.75	0.17	--	--	--
17	--	--	--	--	--	--	--	--
18	1.12	0.24	1.47	0.44	0.19	--	--	--
19	--	--	--	--	--	--	--	--
20	1.12	0.24	1.47	0.32	0.10	--	--	--
21	2.32	0.83	3.43	0.19	0.20	--	--	--

- Airblast Penetration 1981 -

Shot 8

08-SEP-82 11:02:23

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
22	2.38	0.82	3.02	0.22	0.17	--	--	--
23	--	--	--	--	--	--	--	--
24	2.37	0.83	3.24	0.20	0.20	--	--	--
25	5.25	1.45	5.67	0.12	0.15	23.45	0.05	--
26	5.30	1.40	4.74	0.11	0.17	23.50	0.06	--
27	7.98	2.17	6.52	0.12	0.26	20.40	0.07	--
28	7.95	2.23	6.65	0.08	0.17	20.55	0.05	--
29	12.50	2.20	--	0.05	--	15.88	0.08	--
30	13.90	1.54	9.20	0.16	0.42	--	--	--
31	0.31	0.17	0.94	0.99	0.15	--	--	--
32	--	--	--	--	--	--	--	--
33	--	--	--	--	--	--	--	--
34	0.16	0.11	0.38	3.15	0.22	--	--	--
35	0.18	0.15	1.20	2.82	0.42	--	--	--
36	--	--	--	--	--	--	--	--



- Airblast Penetration 1981 -

Shot 9

08-SEP-82 11:02:53

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.16	0.14	0.84	6.50	0.91	--	--	--
2	--	--	--	--	--	--	--	--
3	0.15	0.13	0.35	5.80	0.42	--	--	--
4	0.16	0.22	2.57	0.71	0.33	--	--	--
5	0.16	0.12	0.37	4.20	0.36	--	--	--
6	0.12	--	--	1.22	--	--	--	--
7	0.17	0.10	0.43	4.20	0.28	--	--	--
8	0.14	--	--	1.15	--	--	--	--
9	0.21	0.19	0.90	1.66	0.18	--	--	--
10	--	--	--	--	--	--	--	--
11	0.21	0.10	0.90	1.80	0.16	--	--	--
12	--	--	--	1.80	0.09	--	--	--
13	0.38	0.16	0.82	1.00	0.11	--	--	--
14	0.46	0.16	0.82	1.42	0.17	--	--	--
15	0.39	0.13	1.21	1.50	0.26	--	--	--
16	0.47	0.11	0.59	2.21	0.20	--	--	--
17	--	--	--	--	--	--	--	--
18	0.82	0.20	1.30	0.79	0.22	--	--	--
19	--	--	--	--	--	--	--	--
20	0.82	0.36	1.29	0.50	0.14	--	--	--
21	--	--	--	--	--	--	--	--

- Airblast Penetration 1981 -

shot 9

08-SEP-82 11:03:22

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	imax (MPa- msec)
22	1.95	0.60	2.30	0.36	0.18	--	--	--
23	--	--	--	--	--	--	--	--
24	1.92	0.58	4.31	0.34	0.24	--	--	--
25	4.60	1.45	5.92	0.16	0.22	22.25	0.06	--
26	4.50	1.72	5.20	0.15	0.22	22.30	0.07	--
27	7.12	2.86	7.18	0.13	0.31	19.38	0.06	--
28	7.12	1.88	6.88	0.10	0.20	19.45	0.05	--
29	11.50	2.05	--	0.09	--	14.60	0.11	--
30	12.85	1.15	9.75	0.24	0.52	--	--	--
31	0.15	0.15	0.35	1.55	0.11	--	--	--
32	--	--	--	--	--	--	--	--
33	--	--	--	--	--	--	--	--
34	0.03	0.15	0.38	5.80	0.40	--	--	--
35	--	--	--	--	--	--	--	--
36	--	--	--	--	--	--	--	--

- Airblast Penetration 1981 -

Shot 10

08-SEP-82 11:03:52

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.13	0.08	1.15	3.20	0.43	--	--	--
2	--	--	--	--	--	--	--	--
3	0.14	0.11	1.13	3.10	0.41	--	--	--
4	0.13	0.09	1.14	3.20	0.45	--	--	--
5	0.16	0.15	1.33	2.10	0.35	--	--	--
6	0.16	0.12	1.17	2.32	0.33	--	--	--
7	0.16	0.09	1.36	2.95	0.43	--	--	--
8	0.16	0.09	1.06	2.50	0.32	--	--	--
9	0.21	0.14	1.54	1.90	0.36	--	--	--
10	--	--	--	--	--	--	--	--
11	0.20	0.20	2.29	1.40	0.37	--	--	--
12	0.21	0.10	1.29	2.00	0.26	--	--	--
13	0.36	0.16	1.46	1.42	0.31	--	--	--
14	0.33	0.25	2.25	1.46	0.38	--	--	--
15	0.32	0.10	0.96	1.33	0.36	--	--	--
16	0.35	0.25	2.33	1.34	0.41	--	--	--
17	--	--	--	--	--	--	--	--
18	0.63	0.22	2.27	1.12	0.38	--	--	--
19	--	--	--	--	--	--	--	--
20	0.63	0.21	1.94	1.04	0.35	--	--	--
21	--	--	--	--	--	--	--	--

- Airblast Penetration 1981 -

Shot 10

08-SEP-82 11:04:21

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
22	1.42	0.33	2.91	0.70	0.37	--	--	--
23	--	--	--	--	--	--	--	--
24	1.42	0.37	3.08	0.66	0.34	--	0.08	--
25	3.36	1.14	4.76	0.35	0.43	18.15	0.09	--
26	3.35	1.90	5.53	0.24	0.38	18.20	0.10	--
27	5.30	2.38	6.26	0.27	0.60	15.92	0.10	--
28	5.30	1.40	6.55	0.23	0.42	15.95	0.22	--
29	8.82	3.24	--	0.16	--	11.55	--	--
30	9.96	1.28	11.36	0.52	1.22	--	--	--
31	0.14	0.07	--	10.00	--	--	--	--
32	--	--	--	--	--	--	--	--
33	--	--	--	--	--	--	--	--
34	--	--	--	--	--	--	--	--
35	--	--	--	--	--	--	--	--
36	--	--	--	--	--	--	--	--

APPENDIX D

PEAK PRESSURES AND IMPULSES AND  
CHARACTERISTIC TIMES OF 1982 SERIES

- Airblast Penetration 1982 -

Shot 1

09-SEP-82 07:43:26

page no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.14	0.16	1.12	2.90	0.41	--	--	--
2	0.14	0.12	1.18	3.50	0.38	--	--	--
3	0.21	0.18	1.37	2.26	0.36	--	--	--
4	0.20	0.14	1.48	2.60	0.36	--	--	--
5	0.36	0.08	1.74	1.33	0.33	--	--	--
6	0.36	0.15	2.08	1.62	0.36	--	--	--
7	0.66	0.35	1.82	0.92	0.31	--	--	--
8	0.65	0.43	1.91	1.20	0.33	--	--	--
9	1.50	1.18	3.18	0.56	0.35	--	--	--
10	1.50	0.90	2.90	0.55	0.36	--	--	--
11	3.95	2.87	8.05	0.04	0.09	19.60	0.02	
12	6.00	2.70	6.70	0.25	0.47	17.10	0.09	
13	9.90	14.72	--	0.22	--	12.10	--	
14	0.14	0.10	0.30	9.88	0.56	--	--	

- Airblast Penetration 1982 -

Shot 2

09-SEP-82 07:44:02

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Td (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.14	0.08	0.86	2.43	0.21	--	--	--
2	0.14	0.12	0.90	2.10	0.19	--	--	--
3	--	--	--	--	--	--	--	--
4	0.20	0.09	0.92	1.80	0.19	--	--	--
5	0.38	0.15	1.24	0.90	0.18	--	--	--
6	0.36	0.30	1.26	0.90	0.18	--	--	--
7	0.86	0.68	1.70	0.49	0.18	--	--	--
8	0.88	0.51	1.70	0.59	0.20	--	--	--
9	1.92	1.36	2.66	0.30	0.22	--	--	--
10	1.90	1.50	2.60	0.28	0.22	7.90	0.04	--
11	4.30	2.40	4.55	0.17	0.26	22.50	0.08	--
12	7.30	2.50	5.70	0.15	0.39	19.20	0.08	--
13	11.62	4.48	--	0.12	--	14.70	0.14	--
14	0.14	0.03	0.26	11.50	0.33	--	--	--

- Airblast Penetration 1982 -

Shot 3

09-SEP-82 07:44:21

gauge no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.20	0.14	1.38	5.10	0.81	--	--	--
2	0.20	0.12	1.38	4.44	0.67	--	--	--
3	0.26	0.26	1.85	2.42	0.66	--	--	--
4	0.26	0.26	2.49	3.20	0.62	--	--	--
5	0.36	0.34	2.52	2.20	0.70	--	--	--
6	0.41	0.23	2.54	2.82	0.70	--	--	--
7	0.62	0.45	3.13	1.28	0.65	--	--	--
8	0.60	0.48	2.48	1.95	0.66	--	--	--
9	1.17	0.94	4.58	0.98	0.61	--	--	--
10	1.15	0.93	4.75	1.05	0.65	--	--	--
11	3.03	2.54	6.72	0.57	0.66	16.30	0.10	--
12	4.55	3.15	8.05	0.39	0.72	14.20	0.14	--
13	9.80	3.40	--	0.32	--	12.30	0.40	--
14	0.18	0.03	0.29	21.30	0.79	--	--	--



- Airblast Penetration 1982 -

Shot 4

09-SEP-82 07:44:40

stage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.10	0.14	0.34	12.26	1.28	--	--	--
2	--	--	--	--	--	--	--	--
3	0.11	0.07	0.20	4.21	0.23	--	--	--
4	0.12	0.08	1.33	4.70	0.46	--	--	--
5	0.22	0.24	2.63	2.80	0.54	--	--	--
6	0.24	0.44	2.76	2.61	0.52	--	--	--
7	0.48	0.26	2.70	1.79	0.61	--	--	--
8	0.47	0.25	2.73	2.18	0.61	--	--	--
9	1.08	0.82	4.49	0.76	0.55	--	--	--
10	1.09	0.71	4.26	0.83	0.59	--	--	--
11	2.81	1.72	6.31	0.48	0.58	16.20	0.15	--
12	4.51	2.74	8.15	0.34	0.65	14.30	0.15	--
13	7.89	4.21	--	0.22	--	10.50	0.38	--
14	0.10	0.10	0.29	4.69	0.30	--	--	--

- Airblast Penetration 1982 -

Shot 5

09-SEP-82 08:09:22

stage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.11	0.05	0.99	7.62	0.29	--	--	--
2	--	--	--	--	--	--	--	--
3	0.14	0.07	1.77	2.70	0.31	--	--	--
4	0.16	0.11	1.66	2.95	0.30	--	--	--
5	--	--	--	--	--	--	--	--
6	0.28	0.23	1.63	1.89	0.34	--	--	--
7	--	--	--	--	--	--	--	--
8	0.60	0.29	0.96	1.34	0.29	--	--	--
9	1.38	1.15	2.95	0.43	0.30	--	--	--
10	1.38	0.77	3.12	0.50	0.32	--	--	--
11	3.65	2.10	5.30	0.30	0.37	19.40	0.11	--
12	5.90	8.70	12.35	0.21	0.42	16.90	0.08	--
13	9.60	4.31	--	0.16	--	12.50	0.15	--
14	0.08	0.05	0.17	11.50	0.35	--	--	--

- Airblast Penetration 1982 -

Shot 6

09-SEP-82 08:09:38

stage no.	---First Pulse---				---Second Pulse---			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa) msec	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa) msec
1	0.12	0.08	0.22	6.64	0.37	--	--	--
2	0.10	0.08	0.22	6.00	0.50	--	--	--
3	0.16	0.10	1.69	3.65	0.56	--	--	--
4	0.17	0.07	2.38	4.60	0.56	--	--	--
5	0.26	0.23	2.99	2.40	0.64	--	--	--
6	0.27	0.22	2.65	2.98	0.63	--	--	--
7	0.45	0.37	3.13	1.55	0.59	--	--	--
8	0.42	0.29	3.10	2.26	0.63	--	--	--
9	1.10	0.52	4.22	0.80	0.57	--	--	--
10	1.10	0.52	4.23	1.02	0.58	--	--	--
11	2.95	1.45	6.17	0.50	0.62	16.60	0.12	--
12	4.80	2.10	7.90	0.38	0.70	14.70	0.14	--
13	7.90	4.05	--	0.27	--	10.55	0.38	--
14	--	--	--	--	--	--	--	--

- Airblast Penetration 1982 -

Shot 7

09-SEP-82 08:09:53

sage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.08	0.07	1.87	7.90	0.59	--	--	--
2	0.06	0.05	2.06	8.07	0.58	--	--	--
3	0.10	0.13	2.32	3.60	0.51	--	--	--
4	--	--	--	--	--	--	--	--
5	0.21	0.16	2.86	2.30	0.56	--	--	--
6	0.21	0.11	2.44	2.81	0.56	--	--	--
7	0.48	0.15	2.87	2.18	0.55	--	--	--
8	0.46	0.20	2.56	2.00	0.55	--	--	--
9	1.02	0.61	3.87	0.78	0.55	--	--	--
10	1.02	0.58	3.91	0.83	0.52	--	--	--
11	2.99	0.89	5.59	0.46	0.57	16.68	0.14	--
12	4.70	2.60	7.19	0.33	0.64	14.78	0.12	--
13	8.00	4.30	--	0.24	--	10.60	0.34	--
14	0.06	0.07	0.19	5.35	0.22	--	--	--

# - Airblast Penetration 1982 -

Shot 8

09-SEP-82 07:44:56

stage no.	First Pulse				Second Pulse			
	arriv. time, Ta (msec)	inter. time, T <sub>00</sub> (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.09	0.05	1.72	9.60	0.76	--	--	--
2	0.06	0.09	1.02	12.90	0.88	--	--	--
3	0.10	0.11	2.78	5.18	0.69	--	--	--
4	--	--	--	--	--	--	--	--
5	0.20	0.12	3.10	4.10	0.88	--	--	--
6	0.20	0.12	3.12	4.60	0.86	--	--	--
7	0.42	0.14	3.48	3.32	0.95	--	--	--
8	0.42	0.22	3.26	3.16	0.94	--	--	--
9	0.98	0.32	4.52	2.05	0.89	--	--	--
10	0.95	0.35	4.70	1.78	0.93	--	--	--
11	2.40	0.75	7.05	0.90	0.91	13.90	0.13	--
12	3.79	1.99	8.11	0.56	0.98	12.35	0.21	--
13	6.60	3.40	--	0.45	--	9.00	0.65	--
14	0.06	0.04	0.30	30.00	1.09	--	--	--

- Airblast Penetration 1982 -

Shot 9

09-SEP-82 08:10:09

gauge no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.34	0.07	1.62	0.88	0.08	--	--	--
2	0.33	0.15	2.01	0.61	0.07	--	--	--
3	0.50	0.13	2.24	0.24	0.04	--	--	--
4	0.47	0.04	2.63	0.33	0.02	--	--	--
5	0.88	0.40	2.26	0.13	0.04	--	--	--
6	0.89	0.21	2.47	0.14	0.04	--	--	--
7	1.63	0.75	2.47	0.09	0.05	--	--	--
8	1.63	0.46	2.40	0.09	0.04	--	--	--
9	3.58	0.62	3.33	0.06	0.05	--	--	--
10	3.52	0.98	3.01	0.05	0.05	--	--	--
11	7.73	1.87	4.27	0.04	0.05	--	--	--
12	11.10	2.50	4.35	0.03	0.05	--	--	--
13	16.60	2.58	--	0.03	--	20.20	0.02	--

- Airblast Penetration 1982 -

Shot 10

09-SEP-82 08:10:23

gauge no.	First Pulse				Second Pulse			
	arriv. time, Ta (msec)	inter. time, Td (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.41	0.10	1.73	0.39	0.08	--	--	--
2	0.42	0.09	2.00	0.82	0.08	--	--	--
3	0.55	0.15	2.39	0.26	0.05	--	--	--
4	0.59	0.53	2.29	0.19	0.03	--	--	--
5	0.90	0.36	2.10	0.13	0.05	--	--	--
6	0.92	0.18	2.28	0.18	0.05	--	--	--
7	1.65	0.85	3.97	0.09	0.07	--	--	--
8	1.65	0.75	3.96	0.08	0.06	--	--	--
9	3.50	1.28	3.90	0.06	0.05	--	--	--
10	3.52	1.09	4.58	0.06	0.06	--	--	--
11	7.55	1.00	5.26	0.04	0.07	--	--	--
12	10.95	2.68	5.55	0.03	0.06	--	--	--
13	16.40	3.12	--	0.03	--	19.64	0.03	--

- Airblast Penetration 1982 -

Shot 11

09-SEP-82 08:10:48

Sage no.	First Pulse				Second Pulse			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.21	0.46	3.29	0.22	0.20	--	--	--
2	0.26	0.18	2.64	0.59	0.15	--	--	--
3	0.28	0.43	2.72	0.16	0.09	--	--	--
4	0.24	1.22	3.44	0.17	0.06	--	--	--
5	0.69	0.80	2.86	0.11	0.10	--	--	--
6	0.68	0.83	2.81	0.11	0.09	--	--	--
7	1.52	0.93	3.08	0.09	0.10	--	--	--
8	1.50	1.00	3.10	0.09	0.09	--	--	--
9	3.35	1.15	3.77	0.07	0.09	--	--	--
10	3.36	1.72	3.59	0.07	0.10	--	--	--
11	5.80	2.95	5.20	0.04	0.10	--	--	--
12	10.50	2.30	5.10	0.04	0.10	--	--	--
13	16.00	3.55	--	0.04	--	19.55	0.03	--



- Airblast Penetration 1982 -

Shot 12

09-SEP-82 07:45:13

gage no.	First Pulse				Second Pulse			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	1.12	0.07	2.18	1.44	0.22	--	--	--
2	1.11	0.05	2.29	1.63	0.23	--	--	--
3	1.24	0.08	2.71	0.66	0.13	--	--	--
4	1.09	0.40	--	0.38	--	--	--	--
5	1.50	0.35	--	0.19	--	--	--	--
6	1.15	0.32	3.25	0.21	0.12	--	--	--
7	1.96	0.59	4.14	0.17	0.13	--	--	--
8	1.30	0.75	3.70	0.15	0.12	--	--	--
9	3.09	1.11	4.83	0.11	0.13	--	--	--
10	4.75	0.76	4.70	0.11	0.13	--	--	--
11	9.45	3.47	6.07	0.07	0.14	--	--	--
12	10.52	2.76	6.98	0.06	0.14	--	--	--
13	15.70	4.90	--	0.05	--	18.90	0.05	--

- Airblast Penetration 1982 -

Shot 13

09-SEP-82 08:11:06

page no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Td (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.14	0.13	3.47	1.36	0.42	--	--	--
2	0.17	0.11	3.51	2.24	0.41	--	--	--
3	0.28	0.08	3.72	1.15	0.26	--	--	--
4	0.21	0.20	--	1.05	--	--	--	--
5	0.46	0.35	3.45	0.38	0.22	--	--	--
6	0.44	0.22	3.66	0.45	0.21	--	--	--
7	1.00	0.88	5.59	0.22	0.21	--	--	--
8	1.00	0.87	4.80	0.23	0.19	--	--	--
9	2.58	0.94	5.82	0.18	0.22	--	--	--
10	2.50	1.38	5.40	0.15	0.23	--	--	--
11	3.85	2.83	8.15	0.10	0.24	--	--	--
12	3.80	4.65	8.60	0.09	0.23	22.40	0.06	--
13	13.65	5.65	--	0.07	--	16.90	0.07	--

- Airblast Penetration 1982 -

Shot 14

09-SEP-82 08:11:20

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.09	0.07	3.67	2.23	0.64	--	--	--
2	0.08	0.12	4.82	2.52	0.86	--	--	--
3	0.16	0.10	4.50	1.88	0.51	--	--	--
4	0.16	0.18	--	1.62	--	--	--	--
5	0.26	0.32	--	0.73	--	--	--	--
6	0.32	0.24	4.68	0.94	--	--	--	--
7	0.80	0.55	7.70	0.45	0.40	--	--	--
8	0.70	0.60	7.40	0.45	0.39	--	--	--
9	1.90	1.76	7.40	0.25	0.39	--	--	--
10	1.88	1.68	7.72	0.28	0.40	--	--	--
11	4.75	3.65	10.75	0.18	0.42	22.75	0.09	--
12	7.30	4.25	11.50	0.15	0.42	19.80	0.09	--
13	11.60	5.00	--	0.12	--	14.60	0.16	--

- Airblast Penetration 1982 -

Shot 15

09-SEP-82 07:45:41

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.26	0.10	2.74	1.20	0.20	--	--	--
2	0.25	0.11	3.55	0.95	0.20	--	--	--
3	0.38	0.18	3.08	0.54	0.11	--	--	--
4	0.37	0.12	4.19	0.83	0.07	--	--	--
5	0.64	0.16	3.66	0.36	0.11	--	--	--
6	0.63	0.27	2.52	0.29	0.11	--	--	--
7	1.25	1.01	4.15	0.15	0.12	--	--	--
8	1.20	1.00	4.00	0.15	0.11	--	--	--
9	2.90	1.92	4.92	0.10	0.12	--	--	--
10	2.90	1.66	4.90	0.10	0.12	--	--	--
11	6.60	2.50	6.40	0.07	0.13	--	--	--
12	9.70	1.60	6.90	0.06	0.13	23.80	0.04	--
13	15.00	4.70	--	0.05	--	18.40	0.05	--

# - Airblast Penetration 1982 -

Shot 16

09-SEP-82 08:11:39

gauge no.	First Pulse				Second Pulse			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.19	0.08	4.07	1.32	0.30	--	--	--
2	0.20	0.09	4.25	1.60	0.31	--	--	--
3	0.30	0.12	3.32	0.95	0.19	--	--	--
4	0.26	0.14	--	0.90	--	--	--	--
5	0.48	0.30	3.70	0.40	0.17	--	--	--
6	0.47	0.23	3.79	0.39	0.16	--	--	--
7	1.05	1.00	4.65	0.24	0.18	--	--	--
8	1.05	0.95	3.67	0.23	0.16	--	--	--
9	2.52	1.06	5.68	0.16	0.18	--	--	--
10	2.50	1.60	5.00	0.14	0.18	--	--	--
11	5.90	2.50	7.10	0.10	0.20	--	--	--
12	8.90	2.85	7.80	0.08	0.20	22.40	0.05	--
13	13.80	5.80	--	0.07	--	17.00	0.07	--

- Airblast Penetration 1982 -

Shot 17

09-SEP-82 08:11:53

Sage no.	First Pulse				Second Pulse			
	arriv. time, Ta (msec)	inter. time, Td (msec)	pos. dur. (msec)	Pmax (MPa)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa)	Imax (msec)
1	0.12	0.06	4.48	2.72	0.59	--	--	--
2	0.14	0.07	4.61	2.70	0.65	--	--	--
3	0.22	0.08	4.78	2.10	0.40	--	--	--
4	0.18	0.04	4.32	2.48	--	--	--	--
5	0.32	0.39	4.68	1.00	--	--	--	--
6	0.32	0.38	4.68	0.63	--	--	--	--
7	0.30	0.30	6.25	0.40	0.33	--	--	--
8	0.35	0.57	6.25	0.50	0.32	--	--	--
9	2.00	1.09	7.27	0.32	0.33	--	--	--
10	1.90	1.50	7.27	0.24	0.33	--	--	--
11	5.00	2.90	8.93	0.17	0.36	22.25	0.08	0.08
12	6.70	4.25	10.80	0.13	0.37	20.25	0.07	0.07
13	12.00	5.35	--	0.11	--	15.10	0.13	0.13

- Airblast Penetration 1982 -

Shot 18

09-SEP-82 08:12:06

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Td (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.36	0.28	2.94	0.34	0.13	--	--	--
2	0.31	0.17	3.19	0.46	0.11	--	--	--
3	0.46	0.22	2.84	0.22	0.06	--	--	--
4	0.44	0.06	4.06	0.34	--	--	--	--
5	0.35	0.22	3.53	0.18	0.08	--	--	--
6	0.80	0.14	3.07	0.19	0.06	--	--	--
7	1.65	0.45	3.85	0.12	0.07	--	--	--
8	1.66	0.64	3.75	0.11	0.06	--	--	--
9	3.59	0.69	4.37	0.08	0.07	--	--	--
10	3.52	0.76	4.10	0.09	0.08	--	--	--
11	7.60	1.30	5.10	0.05	0.08	--	--	--
12	10.95	1.60	6.25	0.04	0.08	--	--	--
13	16.50	3.20	--	0.04	--	19.75	0.03	--

- Airblast Penetration 1982 -

Shot 19

09-SEP-82 08:12:20

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.42	0.11	2.71	0.85	0.13	--	--	--
2	0.42	0.11	2.53	1.24	0.14	--	--	--
3	0.53	0.13	2.66	0.74	0.10	--	--	--
4	0.52	0.10	2.70	0.94	0.06	--	--	--
5	0.81	0.15	2.97	0.30	0.09	--	--	--
6	0.79	0.14	2.41	0.34	0.09	--	--	--
7	1.49	0.42	3.30	0.22	0.11	--	--	--
8	1.49	0.31	3.21	0.26	0.11	--	--	--
9	3.05	0.40	3.99	0.15	0.11	--	--	--
10	3.03	0.55	3.77	0.15	0.11	--	--	--
11	6.55	1.75	5.05	0.08	0.13	--	--	--
12	9.65	2.20	5.85	0.07	0.14	23.40	0.04	--
13	14.90	4.50	--	0.06	--	18.10	0.05	--



- Airblast Penetration 1982 -

Shot 20

09-SEP-82 07:46:03

page no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.21	0.09	4.29	2.00	0.40	--	--	--
2	0.22	0.09	3.28	3.40	0.45	--	--	--
3	0.29	0.11	2.91	1.80	0.27	--	--	--
4	0.27	0.07	--	1.81	--	--	--	--
5	0.46	0.10	3.94	0.80	0.25	--	--	--
6	0.45	0.15	3.29	0.86	0.25	--	--	--
7	0.95	0.33	3.65	0.47	0.23	--	--	--
8	0.94	0.36	3.71	0.52	0.23	--	--	--
9	2.12	0.90	4.43	0.26	0.24	--	--	--
10	2.11	0.89	4.69	0.28	0.26	--	--	--
11	5.00	1.65	6.20	0.16	0.29	23.20	0.08	--
12	7.70	2.35	7.60	0.13	0.30	20.35	0.06	--
13	12.20	5.05	--	0.10	--	15.30	0.11	--

- Airblast Penetration 1982 -

Shot 21

09-SEP-82 08:12:33

page no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pma (MPa)	Imax (MPa- msec)
1	0.13	0.07	4.87	3.40	0.70	--	--	--
2	0.14	0.08	4.86	3.70	0.70	--	--	--
3	0.19	0.09	4.41	2.50	0.44	--	--	--
4	0.20	0.06	4.80	2.82	--	--	--	--
5	0.33	0.16	4.67	1.20	0.44	--	--	--
6	0.32	0.15	4.50	1.16	0.41	--	--	--
7	0.74	0.21	4.76	0.75	0.36	--	--	--
8	0.73	0.27	4.27	0.75	0.36	--	--	--
9	1.70	0.40	4.55	0.47	0.35	--	--	--
10	1.70	0.55	4.70	0.41	0.38	--	--	--
11	4.25	1.45	7.50	0.23	0.40	21.32	0.08	--
12	6.60	1.60	8.15	0.19	0.43	18.50	0.08	--
13	10.70	5.65	--	0.13	--	13.75	0.16	--

- Airblast Penetration 1982 -

Shot 22

09-SEP-82 09:12:48

page no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.26	0.10	--	1.15	--	--	--	--
2	0.22	0.12	2.54	1.15	0.21	--	--	--
3	0.31	0.11	2.57	0.70	0.13	--	--	--
4	0.31	0.12	3.25	0.87	0.08	--	--	--
5	0.56	0.08	2.76	0.43	0.12	--	--	--
6	0.57	0.13	2.55	0.39	0.12	--	--	--
7	1.22	0.28	2.83	0.22	0.13	--	--	--
8	1.22	0.42	2.78	0.26	0.12	--	--	--
9	2.75	0.50	3.80	0.18	0.14	--	--	--
10	2.75	0.25	3.65	0.15	0.15	--	--	--
11	6.25	1.15	5.30	0.10	0.16	--	--	--
12	9.85	1.15	5.30	0.08	0.16	23.00	0.04	--
13	14.25	6.95	--	0.05	--	17.55	0.04	--

- Airblast Penetration 1982 -

Shot 23

09-SEP-82 08:13:02

gage no.	First Pulse			Second Pulse		
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa)
1	0.09	0.06	4.91	--	--	--
2	0.09	0.06	4.92	--	--	--
3	0.12	0.07	4.88	0.76	--	--
4	0.14	0.04	4.86	--	--	--
5	0.23	0.19	4.77	--	--	--
6	0.23	0.12	4.77	--	--	--
7	0.52	0.18	8.08	0.78	--	--
8	0.52	0.28	6.98	0.70	--	--
9	1.28	0.44	8.72	0.66	--	--
10	1.29	0.26	8.71	0.69	--	--
11	3.30	1.00	9.80	0.66	18.45	0.12
12	5.25	2.25	10.85	0.72	16.10	0.14
13	9.75	5.60	--	--	11.60	0.29

# - Airblast Penetration 1982 -

Shot 24

09-SEP-82 08:13:15

gauge no.	First Pulse				Second Pulse			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa) msec	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa) msec
1	0.49	0.39	4.51	0.33	0.25	--	--	--
2	0.49	0.25	4.21	0.38	0.24	--	--	--
3	0.64	0.66	4.36	0.05	0.12	--	--	--
4	0.42	--	7.00	0.12	0.11	--	--	--
5	1.00	0.88	3.96	0.13	0.15	--	--	--
6	0.98	0.82	4.08	0.13	0.14	--	--	--
7	1.85	0.97	4.00	0.18	0.20	--	--	--
8	1.90	1.18	4.22	0.12	0.17	--	--	--
9	3.60	1.75	7.40	0.05	0.12	--	--	--
10	3.62	2.08	6.73	0.06	0.08	--	--	--
11	7.35	2.20	7.00	0.08	0.17	--	--	--
12	10.30	3.10	7.60	0.07	0.18	24.25	0.03	0.03
13	15.50	5.85	--	0.06	--	18.85	0.06	0.06
14	15.50	7.10	--	0.05	--	18.80	0.07	0.07

- Airblast Penetration 1982 -

Shot 25

09-SEP-82 08:13:29

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.43	0.44	4.57	0.60	0.36	--	--	--
2	0.43	0.82	5.47	0.31	0.34	--	--	--
3	0.60	1.20	6.40	0.36	--	--	--	--
4	0.55	2.80	7.85	0.35	0.16	--	--	--
5	0.96	0.65	5.04	0.37	0.25	--	--	--
6	0.92	0.66	4.68	0.25	0.24	--	--	--
7	1.70	1.40	4.55	0.24	0.28	--	--	--
8	1.73	1.27	5.07	0.18	0.23	--	--	--
9	3.30	1.60	5.70	0.13	0.14	--	--	--
10	3.25	1.25	6.75	0.15	0.15	--	--	--
11	6.60	2.15	6.90	0.11	0.25	--	--	--
12	9.45	4.05	8.15	0.09	0.27	22.80	0.06	--
13	14.35	6.65	--	0.08	--	17.60	0.09	--
14	14.30	6.40	--	0.08	--	17.55	0.09	--

- Airblast Penetration 1982 -

Shot 26

09-SEP-82 07:46:39

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.69	0.15	3.57	0.68	0.23	--	--	--
2	0.68	0.19	4.22	0.54	0.19	--	--	--
3	1.13	0.09	--	0.30	--	--	--	--
4	0.68	--	7.72	0.29	0.11	--	--	--
5	1.20	0.43	3.80	0.23	0.16	--	--	--
6	1.10	1.18	4.30	0.16	0.13	--	--	--
7	2.00	1.10	3.75	0.16	0.18	--	--	--
8	2.04	0.86	4.31	0.14	0.15	--	--	--
9	3.80	1.50	4.85	0.10	0.09	--	--	--
10	3.76	1.92	6.24	0.12	0.10	--	--	--
11	7.35	2.65	5.90	0.08	0.16	--	--	--
12	10.40	2.05	7.00	0.08	0.16	23.80	0.06	--
13	15.35	3.00	--	0.07	--	18.60	0.07	--
14	15.35	3.15	--	0.06	--	18.60	0.06	--

- Airblast Penetration 1982 -

Shot 27

09-SEP-82 07:46:55

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.59	0.18	3.91	0.90	0.27	--	--	--
2	0.46	0.30	4.14	0.38	0.27	--	--	--
3	1.00	0.33	9.00	0.41	0.14	--	--	--
4	0.56	--	7.39	0.29	0.12	--	--	--
5	1.05	0.55	3.90	0.25	0.17	--	--	--
6	0.96	0.74	4.34	0.23	0.19	--	--	--
7	1.92	1.78	3.93	0.19	0.25	--	--	--
8	1.90	1.30	4.20	0.15	0.18	--	--	--
9	3.60	1.92	6.40	0.12	0.13	--	--	--
10	3.62	1.18	6.38	0.13	0.11	--	--	--
11	7.10	1.55	6.35	0.09	0.18	--	--	--
12	10.00	3.35	8.35	0.08	0.20	23.50	0.06	--
13	14.95	3.15	--	0.08	--	18.22	0.07	--
14	15.00	3.15	--	0.07	--	18.25	0.09	--



- Airblast Penetration 1982 -

Shot 28

09-SEP-82 07:47:24

gauge no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.66	0.14	3.44	0.38	0.09	--	--	--
2	0.75	0.55	3.45	0.12	0.09	--	--	--
3	0.90	0.50	8.15	0.11	0.04	--	--	--
4	1.45	0.95	1.80	0.17	0.03	--	--	--
5	1.30	0.70	3.80	0.14	0.07	--	--	--
6	--	--	--	0.09	0.05	--	--	--
7	--	--	--	0.09	0.07	--	--	--
8	3.20	0.65	3.30	0.09	0.06	--	--	--
9	--	--	--	0.05	0.04	--	--	--
10	--	--	--	0.05	0.05	--	--	--
11	8.50	2.10	5.25	0.04	0.07	--	--	--
12	12.00	2.40	5.25	0.04	0.06	--	--	--
13	17.35	2.65	--	0.03	--	20.70	0.04	--
14	17.50	2.40	--	0.03	--	20.82	0.03	--

- Airblast Penetration 1982 -

Shot 29

09-SEP-82 07:47:40

gauge no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.50	0.15	3.86	0.46	0.17	--	--	--
2	0.55	0.53	4.07	0.25	0.17	--	--	--
3	0.72	0.68	5.43	0.15	0.06	--	--	--
4	1.10	--	5.28	0.20	0.05	--	--	--
5	1.10	0.60	3.52	0.20	0.12	--	--	--
6	1.10	0.98	3.58	0.12	0.09	--	--	--
7	1.95	0.60	3.55	0.16	0.16	--	--	--
8	2.10	0.70	3.90	0.20	0.12	--	--	--
9	3.95	0.65	4.87	0.10	0.08	--	--	--
10	3.90	1.00	5.38	0.10	0.06	--	--	--
11	7.90	0.55	5.30	0.08	0.13	--	--	--
12	10.90	2.95	6.10	0.06	0.13	--	--	--
13	16.20	2.30	--	0.06	--	19.45	0.06	--
14	16.20	2.52	--	0.05	--	19.50	0.06	--

- Airblast Penetration 1982 -

Shot 30

09-SEP-82 08:13:57

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	1.00	0.50	3.95	0.16	0.08	--	--	--
2	0.80	--	3.60	0.11	0.06	--	--	--
3	1.10	--	4.60	0.13	0.02	--	--	--
4	2.20	--	2.30	0.22	0.02	--	--	--
5	2.40	--	2.75	0.10	0.04	--	--	--
6	2.46	--	2.54	0.10	0.04	--	--	--
7	3.00	--	2.60	0.09	0.05	--	--	--
8	2.85	--	3.50	0.09	0.04	--	--	--
9	4.00	--	3.50	0.08	0.03	--	--	--
10	4.50	--	4.50	0.08	0.03	--	--	--
11	3.40	3.20	5.00	0.03	0.04	--	--	--
12	13.00	1.60	4.00	0.03	0.04	22.35	0.02	--
13	18.70	2.40	--	0.03	--	22.25	0.03	--
14	18.80	1.70	--	0.02	--	--	--	--

- Airblast Penetration 1982 -

Shot 31

09-SEP-82 08:14:11

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa) msec	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa) msec
1	0.38	0.27	5.62	1.58	0.64	--	--	--
2	0.28	0.34	5.34	0.49	0.51	--	--	--
3	0.42	--	--	0.75	--	--	--	--
4	0.42	--	0.08	0.58	0.22	--	--	--
5	0.75	0.55	4.77	0.58	0.40	--	--	--
6	0.70	0.85	4.80	0.43	0.38	--	--	--
7	1.42	0.44	4.13	0.44	0.38	--	--	--
8	1.40	0.52	4.90	0.46	0.32	--	--	--
9	2.70	1.51	5.80	0.23	0.20	--	--	--
10	2.70	1.00	5.10	0.21	0.26	--	--	--
11	5.65	2.75	8.25	0.17	0.36	23.55	0.09	--
12	8.10	3.95	8.40	0.09	0.26	20.50	0.06	--
13	12.62	5.73	--	0.10	--	15.75	0.14	--
14	12.62	5.63	--	0.07	--	15.80	0.09	--

- Airblast Penetration 1982 -

Shot 32

09-SEP-82 08:14:25

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	--	--	--	--	--	--	--	--
2	--	--	--	--	--	--	--	--
3	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--	--
5	0.17	0.17	4.18	4.18	0.99	--	--	--
6	0.14	0.14	3.16	3.66	0.89	--	--	--
7	0.34	0.17	3.30	3.80	1.09	--	--	--
8	0.36	0.28	3.70	2.53	1.05	--	--	--
9	0.91	0.20	3.84	2.96	1.06	--	--	--
10	0.85	0.25	3.90	1.90	1.05	--	--	--
11	2.25	0.75	9.00	1.05	0.48	13.45	0.05	--
12	3.70	0.90	6.50	0.82	0.93	11.95	0.26	--
13	6.30	1.75	--	0.55	--	8.60	0.80	--
14	6.30	2.25	--	0.40	--	8.60	0.60	--

- Airblast Penetration 1982 -

Shot 33

09-SEP-82 08:14:39

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	--	--	--	--	--	--	--	--
2	--	--	--	--	--	--	--	--
3	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--	--
5	0.12	0.11	3.88	4.10	0.98	--	--	--
6	0.13	0.12	2.75	4.25	0.89	--	--	--
7	0.33	0.17	4.75	4.08	1.28	--	--	--
8	0.33	0.17	3.60	3.80	1.11	--	--	--
9	0.33	0.24	5.55	2.58	1.22	--	--	--
10	0.82	0.26	5.13	2.05	1.16	--	--	--
11	2.20	1.20	8.50	0.72	0.42	13.00	0.06	--
12	3.45	0.90	6.90	0.70	1.03	11.45	0.25	--
13	6.00	2.00	--	0.53	--	8.28	0.70	--
14	6.00	2.90	--	0.43	--	8.28	0.65	--

- Airblast Penetration 1982 -

Shot 34

09-SEP-82 08:14:52

gage no.	First Pulse				Second Pulse			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	--	--	--	--	--	--	--	--
2	--	--	--	--	--	--	--	--
3	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--	--
5	0.09	0.08	3.91	9.60	1.10	--	--	--
6	0.09	0.10	2.57	5.38	0.85	--	--	--
7	0.25	0.17	6.25	4.40	1.49	--	--	--
8	0.28	0.37	4.97	3.20	1.31	--	--	--
9	0.75	0.35	6.85	2.52	1.35	--	--	--
10	0.76	0.20	4.69	2.90	1.32	--	--	--
11	2.00	1.00	6.85	1.26	1.08	12.45	0.20	--
12	3.25	1.40	7.30	0.73	1.08	11.00	0.26	--
13	5.70	1.65	--	0.66	--	7.90	0.90	--
14	5.70	2.09	--	0.54	--	7.90	0.70	--

- Airblast Penetration 1982 -

Shot 35

09-SEP-82 07:48:18

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, To (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	--	--	--	--	--	--	--	--
2	--	--	--	--	--	--	--	--
3	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--	--
5	0.10	0.12	4.90	7.50	1.48	--	--	--
6	0.10	0.12	4.90	6.40	1.23	--	--	--
7	0.26	0.17	4.74	6.20	2.02	--	--	--
8	0.27	0.23	4.73	5.56	1.76	--	--	--
9	0.62	0.25	4.39	4.00	2.28	--	--	--
10	0.62	0.13	4.38	6.20	2.44	--	--	--
11	1.51	0.59	--	2.61	--	8.85	0.38	--
12	2.41	0.69	--	1.70	--	7.95	0.54	--
13	4.10	1.30	--	1.22	--	5.75	1.82	--
14	4.10	1.85	--	1.21	--	5.75	1.76	--



- Airblast Penetration 1982 -

Shot 36

09-SEP-82 07:48:34

gauge no.	First Pulse				Second Pulse			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa) msec	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa) msec
1	--	--	--	--	--	--	--	--
2	--	--	--	--	--	--	--	--
3	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--	--
5	--	--	--	--	--	--	--	--
6	0.10	0.10	3.15	9.40	1.21	--	--	--
7	0.25	0.17	4.75	7.00	2.12	--	--	--
8	0.25	0.21	4.50	6.80	1.90	--	--	--
9	0.61	0.16	4.39	5.10	2.44	--	--	--
10	0.60	0.14	4.40	5.80	2.50	--	--	--
11	1.45	0.60	--	2.62	--	8.20	0.60	--
12	2.35	0.55	--	2.00	--	7.40	0.88	--
13	4.00	2.60	--	1.22	--	5.70	2.80	--
14	4.00	3.50	--	1.45	--	5.70	2.55	--

- Airblast Penetration 1982 -

Shot 37 ROUND TUNNEL

03-JAN-83 08:57:16

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
A-1	0.33	0.17	0.86	0.87	0.14	8.39	0.13	0.09
A-2	0.33	0.12	0.78	0.76	0.11	8.40	0.10	0.07
A-3	0.81	0.28	2.29	0.51	0.04	7.52	0.03	--
A-4	0.82	0.20	1.28	0.70	0.19	7.51	0.20	0.01
A-5	1.70	0.42	1.92	0.31	0.16	6.39	0.08	0.09
A-6	1.70	0.62	2.18	0.24	0.15	6.39	0.08	0.09
A-7	2.50	0.70	2.70	0.26	0.18	5.60	0.12	0.13
A-8	2.51	0.59	2.47	0.30	0.21	5.60	0.14	0.13
A-9	3.00	0.75	--	0.21	--	4.96	0.17	0.20
A-10	2.99	0.66	--	0.20	--	4.95	0.16	0.19
A-11	3.53	1.37	--	0.19	--	4.27	0.04	0.06
A-12	3.53	1.30	--	0.16	--	4.25	0.24	0.39

- Airblast Penetration 1982 -

Shot 37 SQUARE TUNNEL

03-JAN-83 08:58:20

page no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
B-1	0.26	0.14	0.97	0.79	0.15	8.35	0.10	0.06
B-2	0.28	0.20	0.94	0.62	0.14	8.36	0.08	0.06
B-3	0.82	0.28	1.78	0.47	0.06	7.50	0.03	--
B-4	0.81	0.24	1.29	0.49	0.15	7.48	0.08	--
B-5	1.69	0.39	1.46	0.31	0.17	6.35	0.08	--
B-6	1.69	0.41	1.51	0.29	0.16	6.35	0.10	0.08
B-7	2.44	0.84	1.91	0.20	0.18	5.57	0.11	0.10
B-8	2.46	0.54	2.89	0.20	0.11	5.55	0.04	0.06
B-9	2.95	0.66	--	0.20	--	4.92	0.15	0.21
B-10	2.95	0.80	--	0.24	--	4.92	0.07	0.15
B-11	3.50	1.00	--	0.18	--	4.19	0.27	0.43
B-12	3.48	--	--	0.15	--	4.20	0.23	0.41

- Airblast Penetration 1982 -

Shot 38 ROUND TUNNEL

03-JAN-83 08:59:10

page no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
A-1	0.39	0.21	1.11	1.18	0.27	7.54	0.12	0.09
A-2	0.39	0.21	1.01	1.28	0.25	7.54	0.10	0.08
A-3	0.88	0.39	2.77	0.83	0.06	6.86	0.04	--
A-4	0.85	0.35	1.70	0.72	0.27	6.82	0.20	0.34
A-5	1.63	0.67	2.12	0.38	0.23	5.90	0.16	0.17
A-6	1.62	0.93	2.38	0.36	0.23	5.88	0.14	0.16
A-7	2.30	0.62	2.92	0.36	0.27	5.12	0.20	0.19
A-8	2.30	0.50	2.48	0.38	0.29	5.12	0.21	0.21
A-9	2.76	0.34	--	0.34	--	4.60	0.28	0.36
A-10	2.75	1.25	--	0.26	--	4.60	0.23	0.32
A-11	3.26	1.16	--	0.27	--	3.95	0.05	0.08
A-12	3.25	1.03	--	0.25	--	3.92	0.38	0.65

- Airblast Penetration 1982 -

Shot 38 SQUARE TUNNEL

03-JAN-83 08:59:53

page no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, T <sub>00</sub> (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
B-1	0.32	0.20	1.18	1.25	0.31	7.16	0.08	0.01
B-2	0.36	0.24	1.14	1.90	0.54	7.19	0.20	0.14
B-3	0.80	0.52	2.48	0.56	0.11	6.56	0.04	--
B-4	0.79	0.21	1.41	0.78	0.27	6.54	0.13	0.18
B-5	1.52	0.55	1.75	0.42	0.25	5.62	0.12	--
B-6	1.53	0.67	1.65	0.37	0.25	5.62	0.17	0.12
B-7	2.15	0.75	2.13	0.33	0.26	4.90	0.20	0.22
B-8	2.19	0.40	--	0.38	--	4.90	0.06	0.12
B-9	2.60	0.70	--	0.30	--	4.40	0.26	0.40
B-10	2.60	0.93	--	0.43	--	4.40	0.10	0.34
B-11	3.08	1.02	--	0.28	--	3.70	0.44	0.79
B-12	3.05	1.45	--	0.22	--	3.72	0.46	0.72

- Airblast Penetration 1982 -

Shot 39 ROUND TUNNEL

03-JAN-83 09:00:41

gage no.	---First Pulse---				---Second Pulse---			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa) msec	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa) msec
A-1	0.19	0.22	1.11	2.32	0.45	5.90	0.19	0.17
A-2	0.15	0.17	0.90	1.85	0.30	5.90	0.18	0.15
A-3	0.49	0.21	3.31	1.30	0.09	5.38	0.40	0.07
A-4	0.52	0.34	2.43	1.22	0.38	5.40	0.24	0.13
A-5	1.10	0.40	2.48	0.70	0.36	4.60	0.18	0.18
A-6	1.10	0.20	2.20	0.75	0.35	4.68	0.30	0.20
A-7	1.60	0.23	2.44	0.80	0.38	4.04	0.25	0.32
A-8	1.62	0.22	--	0.55	--	4.02	0.30	0.35
A-9	1.97	0.45	--	0.42	--	3.58	0.38	0.58
A-10	2.00	0.40	--	0.52	--	3.56	0.33	0.54
A-11	2.45	0.75	--	0.42	--	3.08	0.09	0.14
A-12	2.41	0.69	--	0.40	--	3.00	0.70	1.07

- Airblast Penetration 1982 -

Shot 39 SQUARE TUNNEL

03-JAN-83 09:01:44

gauge no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
B-1	0.20	0.15	1.02	1.40	0.36	6.28	0.10	0.11
B-2	0.18	0.20	1.08	1.82	0.40	6.28	0.15	0.11
B-3	0.60	0.36	2.85	0.79	0.14	5.72	0.04	0.08
B-4	0.54	0.21	1.38	0.95	0.34	5.68	0.10	0.13
B-5	1.20	0.20	1.70	0.70	0.33	4.90	0.15	0.17
B-6	1.20	0.32	1.62	0.50	0.27	4.90	0.15	0.13
B-7	1.72	0.28	2.14	0.45	0.32	4.28	0.38	0.32
B-8	1.75	0.25	2.11	0.40	0.19	4.28	0.25	0.19
B-9	2.20	-0.20	--	0.36	--	2.79	0.28	0.54
B-10	2.20	--	--	--	--	2.89	--	0.63
B-11	2.60	0.45	--	0.43	--	3.20	0.58	0.96
B-12	2.60	1.10	--	0.30	--	3.23	0.62	0.93

- Airblast Penetration 1982 -

Shot 40 ROUND TUNNEL

03-JAN-83 09:02:28

gauge no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
A-1	0.10	0.20	2.72	3.10	0.66	4.43	0.10	0.09
A-2	0.10	0.22	2.45	2.18	0.51	4.50	0.25	0.12
A-3	0.38	0.24	3.30	1.75	0.65	4.10	0.20	0.12
A-4	--	--	--	--	--	--	--	--
A-5	0.90	0.35	2.80	1.42	0.67	3.60	0.32	0.41
A-6	0.84	0.64	2.84	0.83	0.58	3.68	0.30	0.42
A-7	1.26	0.94	--	0.80	--	3.26	0.55	0.59
A-8	1.28	0.42	--	1.23	--	3.25	0.43	0.63
A-9	1.56	0.74	--	0.72	--	2.90	0.70	0.91
A-10	1.55	0.31	--	0.83	--	2.85	0.80	0.94
A-11	1.70	--	--	0.30	--	2.22	0.24	--
A-12	1.70	1.55	--	0.62	--	2.22	1.20	1.66



- Airblast Penetration 1982 -

Shot 40 SQUARE TUNNEL

03-JAN-83 09:03:59

Sage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
B-1	0.12	0.11	1.13	3.00	0.50	4.25	--	--
B-2	0.10	0.12	1.08	2.80	0.56	--	--	--
B-3	0.38	0.15	3.17	0.75	0.23	--	--	--
B-4	0.38	0.26	1.42	1.32	0.60	4.25	--	0.16
B-5	--	--	--	--	--	--	--	--
B-6	0.36	0.50	--	0.82	--	3.75	0.38	--
B-7	1.28	0.56	2.02	0.83	0.47	3.30	0.33	0.57
B-8	1.28	0.32	2.02	0.74	0.33	3.30	0.30	0.30
B-9	1.60	0.60	--	0.75	--	2.93	0.60	0.90
B-10	1.62	0.94	--	0.34	--	2.96	0.36	0.80
B-11	1.92	0.40	--	0.72	--	2.43	1.03	1.55
B-12	1.92	0.42	--	0.76	--	2.43	1.35	1.52

- Airblast Penetration 1982 -

Shot 41 ROUND TUNNEL

03-JAN-83 09:04:54

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
A-1	0.10	0.11	2.70	4.80	0.66	3.45	0.30	0.40
A-2	0.30	0.30	2.73	3.00	1.05	3.20	0.40	0.53
A-3	0.30	0.26	2.70	3.02	1.08	3.22	0.40	0.60
A-4	0.68	0.22	0.72	2.30	0.38	2.82	--	--
A-5	0.69	0.32	--	1.95	--	2.82	0.42	0.64
A-6	1.00	0.40	--	1.76	--	2.50	0.60	1.03
A-7	1.00	0.50	--	1.60	--	2.52	0.80	1.03
A-8	1.24	0.39	--	1.28	--	2.23	0.80	1.29
A-9	1.24	0.36	--	1.44	--	2.28	1.46	1.42
A-10	1.55	0.40	--	2.48	--	1.92	1.35	3.10
A-11	1.50	0.60	--	1.10	--	1.90	1.88	2.54
A-12								

- Airblast Penetration 1982 -

Shot 41 SQUARE TUNNEL

03-JAN-83 09:05:53

stage no.	First Pulse				Second Pulse			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
B-1	0.10	0.10	2.66	4.76	0.56	3.78	0.10	0.19
B-2	0.10	0.11	3.18	3.60	0.61	3.78	0.10	0.17
B-3	0.32	0.18	--	3.12	--	3.49	0.15	--
B-4	0.32	0.18	1.73	2.46	0.84	3.49	0.12	0.26
B-5	0.71	0.21	--	2.08	--	3.06	--	--
B-6	0.70	0.30	2.00	1.65	0.75	3.10	0.45	0.50
B-7	1.04	0.38	--	1.21	--	2.71	0.45	0.72
B-8	1.06	0.32	--	1.32	--	2.73	0.45	0.46
B-9	1.30	0.58	--	0.95	--	2.45	1.08	1.12
B-10	1.30	0.42	--	0.96	--	2.43	0.96	1.05
B-11	1.58	0.62	--	1.04	--	2.01	1.95	2.06
B-12	1.58	0.62	--	0.95	--	2.02	1.94	2.08

- Airblast Penetration 1982 -

Shot 42 ROUND TUNNEL

30-DEC-82 15:22:41

gauge no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
A-1	1.36	0.64	3.09	0.09	0.08	14.50	0.02	0.07
A-2	1.32	1.06	2.08	0.25	0.16	14.50	0.05	0.12
A-3	1.80	0.70	2.25	0.30	0.17	13.90	0.06	0.12
A-4	1.80	1.15	1.85	0.24	0.19	13.90	0.06	0.13
A-5	3.35	0.90	2.50	0.18	0.13	11.85	0.08	0.17
A-6	3.38	1.67	3.12	0.08	0.09	11.85	0.05	0.12
A-7	3.95	1.15	3.20	0.16	0.15	11.20	0.10	0.16
A-8	3.95	1.10	2.85	0.15	0.15	11.25	0.08	0.17
A-9	3.00	1.32	3.70	0.18	0.12	12.30	0.13	0.20
A-10	3.25	0.57	2.90	0.22	0.13	12.28	0.06	0.22
A-11	3.78	0.77	4.17	0.18	0.13	11.60	0.13	0.19
A-12	3.80	--	4.25	0.09	0.11	11.60	0.09	0.18

- Airblast Penetration 1982 -

Shot 42 SQUARE TUNNEL

30-DEC-82 15:17:44

gauge no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
B-1	1.35	0.55	2.65	0.05	0.04	16.00	0.02	0.03
B-2	1.38	0.42	1.67	0.45	0.18	16.05	0.07	0.12
B-3	1.80	1.00	2.25	0.29	0.20	15.30	0.10	0.13
B-4	1.80	0.70	2.55	0.25	0.16	15.40	0.07	0.12
B-5	3.92	1.18	3.58	0.15	0.18	12.60	0.11	0.24
B-6	3.94	0.46	3.06	0.27	0.20	12.58	0.14	0.26
B-7	4.54	1.31	3.58	0.16	0.17	11.95	0.08	0.18
B-8	4.50	1.00	3.75	0.15	0.16	11.95	0.10	0.16
B-9	3.72	1.28	3.53	0.12	0.10	13.18	0.07	0.17
B-10	3.80	0.70	3.32	0.13	0.10	13.20	0.07	0.20
B-11	4.50	0.90	3.50	0.11	0.10	12.50	0.06	0.15
B-12	--	--	--	--	--	--	--	--

- Airblast Penetration 1982 -

Shot 43      ROUND TUNNEL

30-DEC-82 15:25:33

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
A-1	0.82	0.36	3.08	0.17	0.09	12.12	0.03	0.09
A-2	0.76	0.32	1.68	0.55	0.24	12.15	0.08	0.15
A-3	1.14	0.24	1.89	0.73	0.26	11.55	0.08	0.17
A-4	1.11	0.65	1.79	0.38	0.26	11.55	0.08	0.20
A-5	2.36	0.36	2.28	0.37	0.23	9.88	0.12	0.25
A-6	2.35	0.35	3.07	0.23	0.13	9.85	0.10	0.16
A-7	2.85	0.93	3.19	0.30	0.24	9.30	0.11	0.23
A-8	2.82	0.88	2.88	0.27	0.24	9.32	0.10	0.23
A-9	2.12	--	3.80	--	0.13	11.62	0.19	0.29
A-10	2.28	--	3.67	--	0.15	11.65	0.15	0.32
A-11	2.85	--	3.45	--	0.18	10.02	0.13	0.28
A-12	2.75	1.35	3.25	0.16	0.15	10.00	0.12	0.22

- Airblast Penetration 1982 -

Shot 43 SQUARE TUNNEL

30-DEC-82 15:24:33

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
B-1	0.72	0.13	1.48	0.14	0.06	12.60	0.02	0.03
B-2	0.70	0.12	1.58	0.97	0.37	12.56	0.06	0.16
B-3	1.03	0.21	2.35	0.77	0.37	12.00	0.10	0.22
B-4	1.00	0.26	1.55	0.56	0.31	12.12	0.07	0.19
B-5	2.53	1.29	3.82	0.30	0.33	9.90	0.10	0.32
B-6	2.52	0.53	3.08	0.54	0.36	9.86	0.15	0.34
B-7	3.03	0.47	3.69	0.38	0.33	9.38	0.15	0.27
B-8	3.00	0.60	4.40	0.35	0.32	9.38	0.15	0.27
B-9	2.60	0.95	2.85	0.23	0.16	11.04	0.14	0.32
B-10	2.55	0.41	1.85	0.21	0.15	11.02	0.15	0.34
B-11	3.20	0.75	2.15	0.20	0.16	10.45	0.13	0.26
B-12	3.12	0.58	3.08	0.16	0.16	10.42	0.13	0.26

- Airblast Penetration 1982 -

Shot 44 ROUND TUNNEL

30-DEC-82 15:28:15

gauge no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	I'ax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	I'ax (MPa- msec)
A-1	1.05	0.27	2.48	0.10	0.06	14.50	0.05	0.06
A-2	1.08	0.42	1.57	0.31	0.14	14.50	0.06	0.11
A-3	1.50	0.85	1.90	0.22	0.15	13.85	0.09	0.13
A-4	1.50	0.45	1.75	0.32	0.16	13.85	0.08	0.14
A-5	3.05	0.35	2.35	0.18	0.11	11.75	0.08	0.14
A-6	3.10	0.40	3.00	0.08	0.07	11.75	0.03	0.11
A-7	3.65	0.80	2.21	0.15	0.13	11.05	0.06	0.16
A-8	3.65	0.67	2.75	0.15	0.13	11.05	0.06	0.16
A-9	2.70	1.20	2.85	0.16	0.11	12.10	0.09	0.16
A-10	3.00	0.40	1.80	0.20	0.11	12.10	0.08	0.18
A-11	3.50	0.68	2.12	0.19	0.12	11.40	0.13	0.17
A-12	3.58	0.78	2.82	0.08	0.09	11.40	0.10	0.15



- Airblast Penetration 1982 -

Shot 44    SQUARE TUNNEL

30-DEC-82 15:26:54

Sage no.	First Pulse				Second Pulse			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
B-1	1.10	0.15	2.63	0.08	0.04	16.30	--	0.03
B-2	1.08	0.35	1.58	0.40	0.16	16.00	0.07	0.13
B-3	1.56	0.24	2.04	0.34	0.17	15.20	0.09	0.13
B-4	1.52	0.56	1.53	0.23	0.15	15.35	0.06	0.12
B-5	3.68	0.82	3.17	0.15	0.15	12.50	0.08	0.22
B-6	3.68	0.52	2.97	0.24	0.18	12.46	0.12	0.24
B-7	4.28	1.02	3.47	0.15	0.15	11.78	0.07	0.16
B-8	4.28	0.84	3.04	0.16	0.14	11.80	0.07	0.16
B-9	3.46	1.14	2.46	0.11	0.08	13.00	0.07	0.16
B-10	3.56	0.44	2.04	0.11	0.09	13.04	0.05	0.17
B-11	4.25	0.75	2.33	0.10	0.09	12.30	0.06	0.13
B-12	4.22	0.88	2.70	0.09	0.09	12.30	0.07	0.14
B-13	6.00	0.96	2.72	0.07	0.10	10.50	0.06	0.12

- Airblast Penetration 1982 -

Shot 45 ROUND TUNNEL

30-DEC-82 15:30:46

gauge no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, T <sub>a</sub> (msec)	inter. time, T <sub>o</sub> (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, T <sub>i</sub> (msec)	Pmax (MPa)	Imax (MPa- msec)
A-1	1.02	0.19	1.78	0.54	0.24	13.12	0.08	0.21
A-2	1.00	0.42	1.78	0.47	0.27	13.12	0.12	0.14
A-3	1.40	0.40	1.96	0.48	0.25	12.50	0.10	0.20
A-4	1.40	0.70	1.80	0.36	0.23	12.50	0.08	0.15
A-5	2.75	0.53	2.35	0.28	0.20	10.70	0.18	0.27
A-6	2.76	0.54	2.99	0.14	0.11	10.70	0.08	0.15
A-7	3.30	0.55	3.20	0.25	0.20	10.10	0.11	0.20
A-8	3.25	0.85	2.70	0.19	0.20	10.05	0.08	0.20
A-9	2.48	1.07	2.77	0.26	0.15	11.32	0.14	0.24
A-10	2.66	0.54	1.79	0.27	0.14	11.35	0.10	0.27
A-11	3.22	0.61	0.98	0.26	0.16	10.65	0.14	0.23
A-12	3.22	0.33	1.38	0.14	0.13	10.65	0.12	0.21

- Airblast Penetration 1982 -

Shot 45 SQUARE TUNNEL

30-DEC-82 15:29:43

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
B-1	1.06	0.26	1.42	0.32	0.17	14.80	0.10	0.12
B-2	1.08	0.18	1.64	0.50	0.20	14.90	0.08	0.13
B-3	1.50	0.35	2.20	0.35	0.22	14.15	0.08	0.16
B-4	1.46	0.47	1.54	0.32	0.19	14.30	0.08	0.13
B-5	3.40	0.55	2.65	0.18	0.21	11.65	0.00	0.25
B-6	3.42	0.38	3.00	0.32	0.23	11.62	0.14	0.27
B-7	3.96	1.29	3.44	0.19	0.20	11.00	0.09	0.19
B-8	3.93	0.72	3.12	0.20	0.20	11.02	0.09	0.18
B-9	3.28	0.76	2.30	0.19	0.12	12.42	0.13	0.22
B-10	3.32	0.43	2.00	0.16	0.11	12.45	0.08	0.22
B-11	4.02	0.60	2.23	0.15	0.12	11.75	0.08	0.18
B-12	3.96	0.74	2.19	0.12	0.12	11.72	0.07	0.19
B-13	5.65	1.07	2.73	0.09	0.12	10.00	0.07	0.10

- Airblast Penetration 1982 -

Shot 46 ROUND TUNNEL

30-DEC-82 15:38:15

stage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
A-1	0.73	0.14	1.63	1.15	0.32	11.05	0.10	0.21
A-2	0.68	0.20	1.50	0.92	0.29	11.10	0.08	0.17
A-3	1.02	0.16	1.33	1.12	0.33	10.55	0.15	0.22
A-4	0.98	0.23	1.70	0.60	0.31	10.60	0.12	0.24
A-5	2.08	0.38	2.22	0.48	0.29	9.05	0.18	0.28
A-6	2.05	0.75	3.00	0.31	0.16	9.02	0.12	0.17
A-8	2.46	0.86	2.66	0.28	0.29	8.52	0.14	0.28
A-9	1.95	0.55	2.17	0.38	0.19	10.02	0.21	0.34
A-10	2.00	0.40	1.60	0.41	0.19	10.03	0.21	0.39
A-11	2.60	0.52	1.75	0.36	0.21	9.44	0.16	0.31
A-12	2.50	0.50	1.35	0.23	0.18	9.42	0.21	0.27
A-14	4.00	0.40	2.95	0.19	0.19	7.90	0.10	0.22

- Airblast Penetration 1982 -

Shot 46 SQUARE TUNNEL

30-DEC-82 15:35:43

Sieve no.	First Pulse				Second Pulse			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa)	Imax (msec)
B-1	0.72	0.17	1.28	0.85	13.00	0.10	0.17	
B-2	0.72	0.18	1.48	0.85	12.46	0.10	0.18	
B-3	1.02	0.18	1.41	0.73	11.50	0.10	0.23	
B-4	1.00	0.33	1.60	0.51	12.00	0.10	0.19	
B-5	2.50	0.40	2.90	0.31	9.80	0.11	0.30	
B-6	2.50	0.80	3.05	0.44	9.80	0.16	0.35	
B-8	3.00	0.72	3.12	0.33	9.25	0.13	0.27	
B-9	2.55	0.75	1.40	0.29	10.98	0.15	0.32	
B-10	2.52	0.36	1.80	0.23	10.98	0.14	0.33	
B-11	3.18	0.40	2.12	0.24	10.35	0.13	0.26	
B-12	3.07	0.53	2.61	0.21	10.35	0.14	0.25	
B-13	4.62	0.88	2.68	0.15	8.72	0.10	0.13	
B-14	4.62	1.08	2.90	0.15	8.75	0.09	0.13	

- Airblast Penetration 1982 -

Shot 47      ROUND TUNNEL

30-DEC-82   15:41:40

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa) msec	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa) msec
A-1	0.67	0.13	1.95	1.00	0.27	11.46	0.08	0.19
A-2	0.62	0.16	1.73	0.98	0.27	11.46	0.08	0.12
A-3	0.95	0.23	1.75	0.81	0.27	10.92	0.09	0.23
A-4	0.92	0.23	1.61	0.50	0.25	10.92	0.09	0.23
A-5	2.10	0.42	2.26	0.41	0.27	9.30	0.20	0.32
A-6	2.08	0.22	2.92	0.35	0.15	9.30	0.08	0.18
A-8	2.50	0.96	2.70	0.23	0.23	8.76	0.10	0.22
A-9	1.91	0.41	2.52	0.31	0.17	10.20	0.22	0.31
A-10	2.03	0.29	1.59	0.39	0.17	10.22	0.17	0.35
A-11	2.60	0.46	1.73	0.33	0.19	9.05	0.14	0.31
A-12	2.50	0.55	1.32	0.20	0.16	9.05	0.15	0.28
A-14	4.04	0.41	3.14	0.18	0.17	8.05	0.11	0.11

- Airblast Penetration 1982 -

Shot 47 SQUARE TUNNEL

30-DEC-82 15:40:08

sage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa) msec	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa) msec
B-1	0.68	0.14	1.18	0.67	0.23	13.20	0.10	0.13
B-2	0.70	0.18	1.50	0.78	0.24	13.32	0.15	0.13
B-3	1.02	0.14	1.16	0.84	0.27	--	--	--
B-4	1.02	0.26	1.48	0.48	0.22	12.84	0.10	0.17
B-5	2.66	0.34	2.86	0.26	0.24	10.38	0.14	0.30
B-6	2.68	0.50	3.02	0.44	0.26	10.36	0.16	0.32
B-8	3.15	0.65	3.15	0.27	0.24	9.80	0.11	0.22
B-9	2.62	0.88	1.50	0.22	0.13	11.35	0.10	0.25
B-10	2.62	0.68	1.88	0.17	0.12	11.35	0.10	0.25
B-11	3.30	0.68	2.20	0.18	0.13	10.65	0.12	0.23
B-12	3.22	0.96	1.78	0.15	0.13	10.68	0.10	0.23
B-13	4.86	0.92	2.69	0.12	0.13	9.04	0.08	0.20
B-14	4.86	0.64	2.89	0.14	0.14	9.02	0.08	0.21

- Airblast Penetration 1982 -

Shot 48 ROUND TUNNEL

03-JAN-83 08:37:26

gauge no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, T <sub>00</sub> (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, T <sub>1</sub> (msec)	Pmax (MPa)	Imax (MPa- msec)
A-1	0.50	0.22	2.10	1.92	0.54	9.22	0.15	0.24
A-2	0.50	0.10	2.12	2.00	0.51	9.22	0.15	0.20
A-3	0.74	0.22	1.81	1.33	0.50	8.82	0.18	0.22
A-4	0.73	0.29	1.97	1.00	0.49	8.85	0.16	0.23
A-5	1.62	0.66	2.10	0.85	0.48	7.70	0.25	0.31
A-6	1.63	0.27	2.81	0.70	0.29	7.68	0.08	0.20
A-8	1.96	0.92	3.74	0.47	0.46	7.28	0.16	0.37
A-9	1.55	0.71	3.07	0.69	0.29	8.80	0.30	0.41
A-10	1.58	0.32	3.63	0.62	0.26	8.80	0.15	0.52
A-11	2.12	0.40	1.56	0.60	0.31	8.38	0.21	0.36
A-12	1.98	1.06	3.44	0.33	0.27	8.32	0.18	0.33
A-14	3.34	0.34	2.76	0.29	0.26	6.98	0.19	0.26



- Airblast Penetration 1982 -

Shot 48 SQUARE TUNNEL

03-JAN-83 08:34:01

stage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
B-1	0.48	0.12	2.70	2.66	0.66	9.82	0.15	0.27
B-2	0.48	0.24	1.90	2.45	0.67	9.76	0.18	0.27
B-3	0.70	0.16	--	1.50	--	--	--	--
B-4	0.70	0.16	1.70	1.16	0.55	9.42	0.14	0.24
B-5	1.86	0.27	3.64	0.75	0.53	7.88	0.15	0.37
B-6	1.86	0.26	2.94	0.97	0.58	7.88	0.35	0.41
B-8	2.20	0.40	4.08	0.60	0.55	7.46	0.19	0.39
B-9	1.96	0.54	3.44	0.54	0.30	9.43	0.18	0.45
B-10	1.88	0.30	4.82	0.37	0.26	9.40	0.23	0.48
B-11	2.43	0.57	4.45	0.77	0.28	8.95	0.20	0.35
B-12	3.34	0.98	4.80	0.35	0.29	8.90	0.14	0.36
B-13	3.72	0.86	3.68	0.26	0.26	7.48	0.21	0.39
B-14	3.70	0.38	3.30	0.28	0.28	7.50	0.18	0.29

- Airblast Penetration 1982 -

Shot 49 ROUND TUNNEL

03-JAN-83 08:42:21

Sage no.	First Pulse				Second Pulse			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa) msec	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa) msec
A-1	0.40	0.35	3.38	1.80	0.82	7.32	0.20	0.25
A-2	0.42	0.26	2.94	3.00	0.75	7.40	0.15	0.19
A-3	0.62	0.27	3.66	1.49	0.74	7.20	0.08	0.09
A-4	0.60	0.16	3.40	1.68	0.85	7.20	0.10	0.28
A-5	1.32	0.63	4.88	1.08	0.80	6.42	0.24	0.25
A-6	1.33	0.27	3.42	1.30	0.50	6.42	0.10	0.34
A-8	1.60	0.30	--	0.85	--	6.18	0.23	0.54
A-9	1.30	0.70	--	0.93	--	7.06	0.30	0.80
A-10	1.33	0.25	--	0.91	--	7.06	0.30	0.80
A-11	1.78	0.34	5.44	0.75	0.55	7.22	0.28	0.71
A-12	1.65	0.75	5.50	0.53	0.50	7.25	0.30	0.60
A-14	2.80	0.32	--	0.42	--	6.18	0.26	0.70

- Airblast Penetration 1982 -

Shot 49 SQUARE TUNNEL

03-JAN-83 08:40:15

age no.	First Pulse				Second Pulse			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
B-1	0.44	0.18	2.70	2.18	0.73	--	--	--
B-2	0.41	0.10	3.04	1.75	0.69	8.95	0.14	0.30
B-3	--	--	--	--	--	--	--	--
B-4	0.64	0.18	1.94	2.02	0.70	8.62	0.25	0.34
B-5	1.69	0.41	3.41	0.85	0.58	7.32	0.18	0.47
B-6	1.70	0.30	3.40	1.05	0.62	7.30	0.35	0.47
B-8	--	--	--	--	--	--	--	--
B-9	1.81	0.61	5.27	0.66	0.35	8.76	0.28	0.52
B-10	1.70	0.30	5.05	0.38	0.30	8.67	0.26	0.53
B-11	2.22	0.40	4.58	0.38	0.30	8.39	0.17	0.41
B-12	2.16	0.90	4.70	0.36	0.30	8.30	0.17	0.40
B-13	3.40	0.75	--	0.27	--	7.00	0.19	0.45
B-14	3.38	0.52	--	0.33	--	7.00	0.17	0.45

- Airblast Penetration 1982 -

Shot 50 ROUND TUNNEL

03-JAN-83 08:44:48

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa)	
A-1	1.50	0.30	1.72	0.18	0.08	--	--	
A-2	1.46	0.48	2.16	0.13	0.08	--	--	
A-3	1.96	0.30	2.06	0.31	0.17	--	--	
A-4	1.96	0.88	1.90	0.20	0.17	--	--	
A-5	3.45	0.40	1.63	0.28	0.15	--	0.19	
A-6	3.85	0.33	2.20	0.16	0.07	0.12	0.08	
A-9	3.20	0.95	2.70	0.15	0.07	0.03	0.09	
A-10	3.44	0.31	3.06	0.22	0.13	0.04	0.16	
A-11	3.96	0.50	3.22	0.21	0.13	0.08	0.14	
A-12	4.00	0.58	3.75	0.14	0.14	0.12	0.16	
A-13	5.69	0.99	3.35	0.11	0.14	0.09	0.11	
A-14	5.73	0.33	3.99	0.13	0.13	0.08	0.10	

- Airblast Penetration 1982 -

Shot 50 SQUARE TUNNEL

03-JAN-83 08:43:42

page no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
B-1	1.50	0.38	1.60	0.29	0.16	--	--	--
B-2	1.45	0.36	1.75	0.26	0.16	--	--	--
B-3	1.95	0.43	2.11	0.26	0.16	--	--	--
B-4	1.95	0.35	1.85	0.36	0.20	--	--	--
B-5	4.03	1.37	2.03	0.14	0.13	13.20	0.06	0.16
B-6	3.90	0.78	2.50	0.18	0.15	13.16	0.12	0.20
B-9	3.90	0.95	2.90	0.19	0.13	13.14	0.10	0.17
B-10	4.00	0.75	2.95	0.14	0.12	13.12	0.07	0.17
B-11	4.69	0.55	3.15	0.14	0.12	12.45	0.08	0.13
B-12	4.68	1.10	2.82	0.12	0.12	12.45	0.08	0.13
B-13	6.40	1.38	3.65	0.10	0.12	10.72	0.08	0.10
B-14	6.40	1.25	4.08	0.10	0.12	10.75	0.06	0.10

- Airblast Penetration 1982 -

Shot 51 ROUND TUNNEL

03-JAN-83 08:47:02

Sage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa) msec	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa) msec
A-1	1.10	0.25	1.60	0.35	0.10	--	--	--
A-2	1.06	0.34	1.74	0.21	0.09	--	--	--
A-3	1.47	0.41	1.93	0.40	0.20	--	--	--
A-4	1.50	0.60	1.68	0.31	0.20	--	--	--
A-5	2.85	0.43	2.85	0.39	0.17	10.85	0.16	0.22
A-6	2.60	0.85	3.90	0.24	0.09	11.32	0.05	0.12
A-9	2.58	0.94	3.67	0.16	0.09	11.32	0.07	0.10
A-10	2.78	0.34	2.94	0.25	0.16	11.30	0.08	0.21
A-11	3.32	0.56	3.13	0.26	0.16	10.62	0.10	0.16
A-12	3.32	0.63	3.63	0.18	0.17	10.66	0.13	0.18
A-13	4.90	1.05	3.32	0.14	0.17	9.04	0.12	0.13
A-14	4.95	0.75	3.15	0.16	0.16	9.04	0.09	0.10

- Airblast Penetration 1982 -

Shot 51 SQUARE TUNNEL

03-JAN-83 08:45:55

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
B-1	0.98	0.28	1.70	0.55	0.24	--	--	--
B-2	0.98	0.22	1.76	0.56	0.23	--	--	--
B-3	1.34	0.61	2.28	0.39	0.22	--	--	--
B-4	1.33	0.25	1.59	0.56	0.27	--	--	--
B-5	3.04	0.96	3.11	0.23	0.18	11.45	0.11	0.26
B-6	3.00	0.76	3.30	0.37	0.21	11.45	0.10	0.26
B-9	3.03	0.85	3.37	0.30	0.19	11.45	0.11	0.25
B-10	3.06	0.50	2.99	0.27	0.17	11.45	0.11	0.25
B-11	3.76	0.50	3.12	0.22	0.18	10.80	0.10	0.20
B-12	3.65	0.60	3.71	0.20	0.18	10.82	0.12	0.19
B-13	5.20	0.85	3.70	0.15	0.18	9.25	0.10	0.14
B-14	5.20	1.00	3.32	0.15	0.19	9.28	0.08	0.13

- Airblast Penetration 1982 -

Shot 52 ROUND TUNNEL

03-JAN-83 08:49:43

sage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
A-1	0.68	0.32	1.92	0.58	0.18	--	--	--
A-2	0.63	0.30	2.32	0.44	0.17	--	--	--
A-3	0.95	0.25	1.73	1.03	0.35	--	--	--
A-4	0.93	0.75	2.27	0.40	0.33	--	--	--
A-5	1.95	0.35	2.40	0.64	0.31	9.38	0.13	0.28
A-6	2.20	0.28	2.62	0.76	0.23	9.40	0.05	0.15
A-9	1.88	0.68	4.84	0.54	0.30	9.33	0.18	0.32
A-10	1.94	0.34	2.56	0.45	0.26	9.30	0.15	0.31
A-11	2.50	0.40	2.62	0.52	0.25	8.82	0.11	0.22
A-12	2.36	0.82	3.39	0.37	0.27	8.80	0.14	0.25
A-13	3.70	0.80	3.10	0.27	0.28	7.42	0.08	0.25
A-14	3.75	0.67	2.81	0.28	0.24	7.42	0.15	0.20



- Airblast Penetration 1982 -

Shot 52 SQUARE TUNNEL

03-JAN-83 08:48:47

gauge no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
B-1	0.66	0.28	1.79	0.91	0.34	12.35	0.10	0.14
B-2	0.67	0.43	1.83	0.81	0.34	--	--	--
B-3	0.92	0.30	2.40	0.67	0.32	--	--	--
B-4	0.95	0.35	1.77	0.93	0.38	--	--	--
B-5	2.36	0.89	2.62	0.37	0.24	9.96	0.12	0.32
B-6	2.40	0.49	3.10	0.51	0.28	10.00	0.17	0.34
B-9	2.40	0.60	3.18	0.47	0.28	10.00	0.14	0.31
B-10	2.37	1.13	2.97	0.29	0.23	10.00	0.14	0.31
B-11	3.00	0.50	3.00	0.32	0.25	9.45	0.12	0.29
B-12	2.90	0.78	3.40	0.32	0.25	9.45	0.10	0.24
B-13	4.23	0.57	3.72	0.24	0.25	7.98	0.13	0.23
B-14	4.22	0.73	3.30	0.22	0.26	7.98	0.14	0.23

- Airblast Penetration 1982 -

Shot 53 ROUND TUNNEL

03-JAN-83 08:52:25

sage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	I max (MPa) msec)	arriv. time, Ta (msec)	Pmax (MPa)	I max (MPa) msec)
A-1	0.50	0.17	3.28	2.04	0.65	--	--	--
A-2	0.46	0.17	3.14	2.10	0.70	--	--	--
A-3	0.70	0.22	3.05	2.22	0.75	--	--	--
A-4	0.70	0.50	3.70	1.25	0.74	--	--	--
A-5	1.50	0.30	4.02	0.76	0.44	--	--	--
A-6	1.44	0.58	3.68	1.40	0.50	7.92	0.15	0.37
A-9	1.48	0.58	4.20	1.18	0.49	7.90	0.18	0.31
A-10	1.48	0.32	4.05	0.78	0.38	7.88	0.13	0.35
A-11	1.98	0.34	3.09	1.08	0.48	7.88	0.12	0.32
A-12	1.84	0.36	3.78	0.85	0.34	7.48	0.20	0.28
A-13	2.95	0.75	3.15	0.42	0.42	7.48	0.08	0.21
A-14	2.95	0.47	--	0.39	--	6.30	0.26	0.47
						6.28	0.26	0.40

- Airblast Penetration 1982 -

Shot 53 SQUARE TUNNEL

03-JAN-83 08:50:49

page no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa) msec	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa) msec
B-1	0.49	0.22	1.62	1.50	0.69	--	--	--
B-2	0.46	0.22	2.79	1.65	0.64	--	--	--
B-3	0.69	0.46	3.31	1.16	0.75	--	--	--
B-4	0.69	0.32	4.33	1.23	0.69	--	--	--
B-5	1.83	0.72	4.57	0.52	0.35	8.50	0.13	0.36
B-6	1.91	0.37	3.67	0.74	0.39	8.50	0.13	0.40
B-9	1.94	0.36	3.46	0.92	0.49	8.50	0.18	0.47
B-10	1.85	0.88	3.77	0.51	0.34	8.48	0.14	0.36
B-11	2.32	0.38	3.19	0.60	0.40	8.08	0.15	0.35
B-12	2.26	0.52	4.44	0.50	0.39	8.06	0.15	0.36
B-13	3.40	0.60	3.40	0.41	0.37	6.80	0.26	0.47
B-14	3.38	0.72	--	0.34	--	6.83	0.22	0.45

- Airblast Penetration 1982 -

Shot 54 ROUND TUNNEL

03-JAN-83 08:55:01

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Td (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
A-1	0.38	0.27	4.62	2.70	1.20	--	--	--
A-2	0.36	0.22	4.24	4.30	1.26	--	--	--
A-3	0.56	0.27	4.46	3.20	1.25	--	--	--
A-4	0.53	0.25	4.31	3.20	1.34	--	--	--
A-5	1.16	0.74	4.54	2.10	0.86	6.25	0.23	0.78
A-6	1.15	0.39	4.20	2.36	0.92	6.25	0.26	0.73
A-9	1.19	0.37	4.41	2.65	1.00	6.26	0.25	0.91
A-10	1.16	0.73	4.79	1.38	0.80	6.22	0.20	0.80
A-11	1.55	0.37	4.03	1.45	0.94	5.98	0.25	0.77
A-12	1.42	0.53	3.70	1.45	0.65	5.94	0.17	0.56
A-13	2.35	0.85	--	0.71	--	5.10	0.42	1.16
A-14	2.32	0.48	--	0.64	--	5.08	0.34	0.96

- Airblast Penetration 1982 -

Shot 54 SQUARE TUNNEL

03-JAN-83 08:54:06

gauge no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	in <sup>ter</sup> . time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
B-1	0.37	0.23	3.06	2.45	1.12	--	--	--
B-2	0.37	0.15	3.01	3.60	1.07	--	--	--
B-3	0.56	0.37	--	1.72	--	--	--	--
B-4	0.54	0.34	4.67	1.88	1.18	--	--	--
B-5	1.46	0.64	4.49	0.92	0.63	7.05	0.30	0.71
B-6	1.58	0.24	4.97	1.50	0.68	7.03	0.32	0.74
B-9	1.60	0.26	5.10	1.86	0.80	7.04	0.28	0.92
B-10	1.46	0.64	5.54	0.91	0.60	7.07	0.23	0.74
B-11	1.88	0.29	4.77	0.90	0.66	6.70	0.18	0.77
B-12	1.82	0.43	4.50	0.68	0.64	6.75	0.30	0.71
B-13	2.78	0.38	--	0.76	--	5.78	0.30	1.04
B-14	2.76	0.38	--	0.47	--	5.73	0.26	1.05

- Airblast Penetration 1982 -

Shot 55

09-SEP-82 08:21:27

gage no.	---First Pulse---				---Second Pulse---			
	arriv. time, T <sub>a</sub> (msec)	inter. time, T <sub>i</sub> (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa) msec	arriv. time, T <sub>a</sub> (msec)	Pmax (MPa)	Imax (MPa) msec
1	1.53	0.68	1.63	0.32	0.19	--	--	--
2	1.53	0.55	1.82	0.29	0.16	--	--	--
3	2.04	0.52	2.18	0.23	0.17	--	--	--
4	2.00	0.56	1.80	0.24	0.16	--	--	--
5	4.10	1.45	3.40	0.18	0.16	12.84	0.06	0.08
6	3.95	1.20	3.65	0.17	0.19	12.82	0.08	0.09
7	4.75	1.07	3.80	0.16	0.19	12.20	0.09	0.09
8	4.64	0.86	3.56	0.14	0.17	12.18	0.08	0.09
9	6.44	0.98	4.04	0.12	0.18	10.60	0.09	0.13
10	6.40	1.48	3.85	0.13	0.17	10.52	0.10	0.13
11	7.70	1.84	--	0.09	--	9.18	0.12	0.20
12	7.70	1.62	--	0.07	--	9.18	0.11	0.10

- Airblast Penetration 1982 -

Shot 56

99-SEP-82 08:21:40

gauge no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	1.06	0.36	1.46	0.57	0.24	--	--	--
2	1.07	0.35	1.60	0.56	0.21	--	--	--
3	1.45	0.40	1.65	0.36	0.23	--	--	--
4	1.44	0.41	1.68	0.33	0.23	--	--	--
5	3.30	1.08	3.42	0.27	0.21	11.50	0.11	0.10
6	3.22	1.03	3.48	0.26	0.26	11.50	0.12	0.11
7	3.90	0.96	3.65	0.24	0.26	10.88	0.11	0.12
8	3.95	0.97	3.37	0.19	0.23	10.98	0.11	0.11
9	5.43	0.72	3.27	0.17	0.24	9.40	0.11	0.18
10	5.42	0.94	3.88	0.18	0.23	9.40	0.14	0.20
11	6.56	1.62	--	0.14	--	8.00	0.20	0.43
12	6.56	1.39	--	0.10	--	9.03	0.13	0.22

- Airblast Penetration 1982 -

Shot 57

09-SEP-82 07:51:43

Sage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.63	0.21	1.62	1.40	0.55	--	--	--
2	0.62	0.36	1.73	1.15	0.50	--	--	--
3	0.90	0.32	3.00	0.95	0.46	--	--	--
4	0.87	0.35	3.06	0.95	0.48	--	--	--
5	2.20	0.90	3.68	0.56	0.39	8.92	0.12	0.17
6	2.25	0.51	3.10	0.82	0.47	8.90	0.12	0.20
7	2.60	0.54	3.50	0.51	0.42	8.47	0.13	0.19
8	2.75	0.63	3.63	0.42	0.42	8.48	0.19	0.20
9	3.88	1.07	--	0.32	--	7.28	0.22	0.43
10	3.99	0.60	--	0.41	--	7.28	0.28	0.44
11	4.32	0.99	--	0.28	--	6.05	0.36	0.92
12	4.30	0.43	--	0.33	--	6.06	0.55	0.65



- Airblast Penetration 1982 -

Shot 58

09-SEP-82 08:22:01

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.50	0.20	4.22	1.91	0.70	--	--	--
2	0.49	0.19	3.51	1.78	0.63	--	--	--
3	0.73	0.42	3.62	1.05	0.60	--	--	--
4	0.72	0.38	3.00	1.20	0.61	--	--	--
5	1.90	0.72	3.70	0.76	0.49	8.09	0.15	0.25
6	1.95	0.43	3.05	1.03	0.60	8.04	0.20	0.29
7	2.32	0.68	4.13	0.63	0.52	7.68	0.20	0.29
8	2.38	0.57	3.78	0.53	0.53	7.68	0.18	0.34
9	3.40	0.83	--	0.38	--	6.62	0.30	0.54
10	3.42	0.53	--	0.60	--	6.62	0.30	0.57
11	4.28	0.85	--	0.35	--	5.44	0.50	1.10
12	4.22	0.53	--	0.40	--	5.42	0.65	0.85

- Airblast Penetration 1982 -

Shot 59

09-SEP-82 08:22:14

sage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Td (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa) msec	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa) msec
1	0.38	0.22	2.92	2.90	1.07	--	--	--
2	0.36	0.37	3.74	2.50	1.06	--	--	--
3	0.55	0.34	4.09	2.00	1.07	--	--	--
4	0.55	0.27	3.22	2.36	1.08	--	--	--
5	1.46	0.70	4.74	1.31	0.82	6.49	0.20	0.64
6	1.59	0.28	3.50	2.00	0.95	6.43	0.23	0.68
7	1.93	0.50	--	1.30	--	6.20	0.30	0.71
8	1.85	0.47	--	0.90	--	6.14	0.25	0.78
9	2.66	0.29	--	0.93	--	5.31	0.30	0.91
10	2.70	0.32	--	1.53	--	5.34	0.50	0.89
11	3.38	0.37	--	0.68	--	4.39	0.90	1.68
12	3.34	0.68	--	0.60	--	4.40	0.90	1.44

- Airblast Penetration 1982 -

Shot 60

09-SEP-82 08:22:26

page no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.40	0.20	3.42	3.10	1.08	--	--	--
2	0.40	0.30	3.50	2.30	0.97	--	--	--
3	0.59	0.29	3.60	2.28	1.06	--	--	--
4	0.57	0.28	3.48	2.05	0.98	--	--	--
5	1.48	0.30	4.74	1.02	0.80	6.47	0.25	0.59
6	1.58	0.20	3.58	3.02	1.05	6.47	0.33	0.68
7	1.78	0.52	--	1.31	--	6.20	0.50	0.67
8	1.82	0.34	3.33	1.15	0.85	6.13	0.43	0.73
9	2.58	0.42	--	0.90	--	5.26	0.73	1.05
10	2.57	0.75	--	0.95	--	5.26	0.61	1.03
11	3.25	0.75	--	0.50	--	4.29	0.86	2.07
12	3.25	0.80	--	0.52	--	4.30	1.21	1.59

- Airblast Penetration 1982 -

Shot 61

09-SEP-82 08:22:39

base no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.48	0.27	3.27	1.76	0.72	--	--	--
2	0.48	0.25	3.15	1.50	0.62	--	--	--
3	0.71	0.35	3.91	1.35	0.67	--	--	--
4	0.70	0.40	4.02	1.28	0.67	--	--	--
5	1.78	0.34	4.32	0.82	0.61	7.55	0.18	0.31
6	1.89	0.31	3.58	1.58	0.74	7.50	0.23	0.37
7	2.12	0.64	4.36	0.70	0.60	7.19	0.20	0.38
8	2.16	0.36	3.54	0.74	0.60	7.15	0.28	0.37
9	3.07	0.51	--	0.59	--	6.11	0.40	0.71
10	3.06	0.64	--	0.70	--	6.11	0.40	0.73
11	3.85	0.90	--	0.33	--	5.02	0.65	1.49
12	3.85	0.40	--	0.38	--	5.03	0.80	1.01

- Airblast Penetration 1982 -

Shot 62

09-SEP-82 07:51:55

age no.	First Pulse				Second Pulse			
	arriv. time, To (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa) msec)	arriv. time, To (msec)	Pmax (MPa)	Imax (MPa) msec)
1	0.69	0.25	1.41	0.95	0.39	--	--	--
2	0.69	0.24	1.72	0.98	0.34	--	--	--
3	0.98	0.27	1.82	0.80	0.35	--	--	--
4	0.98	0.33	1.74	0.77	0.37	--	--	--
5	2.41	1.09	3.88	0.46	0.40	9.39	0.09	0.10
6	2.52	0.30	3.26	0.86	0.47	9.40	0.15	0.18
7	2.85	0.60	4.00	0.41	0.45	8.91	0.19	0.19
8	2.89	0.57	4.06	0.39	0.41	8.92	0.14	0.17
9	4.03	0.47	--	0.34	--	7.63	0.23	0.46
10	4.02	0.81	--	0.30	--	7.61	0.22	0.43
11	4.99	1.44	--	0.21	--	6.31	0.33	0.90
12	4.99	0.84	--	0.18	--	6.33	0.38	0.59

- Airblast Penetration 1982 -

Shot 63

09-SEP-82 08:22:53

stage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa) msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa) msec)
1	1.11	0.45	1.52	0.50	0.24	--	--	--
2	1.11	0.34	1.77	0.45	0.21	--	--	--
3	1.52	0.30	1.90	0.37	0.20	--	--	--
4	1.52	0.43	1.73	0.40	0.21	--	--	--
5	3.42	0.95	3.42	0.24	0.24	11.56	0.08	0.10
6	3.46	0.49	3.42	0.34	0.29	11.56	0.10	0.12
7	3.98	0.96	3.78	0.25	0.30	10.98	0.10	0.18
8	4.03	0.58	3.43	0.26	0.26	10.98	0.12	0.16
9	5.40	0.69	--	0.19	--	9.46	0.13	0.22
10	5.39	1.28	--	0.17	--	9.45	0.14	0.22
11	6.57	1.21	--	0.13	--	8.93	0.17	0.49
12	6.58	--	--	0.07	--	8.07	0.10	0.29

- Airblast Penetration 1982 -

Shot 64

09-SEP-82 08:23:05

page no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	1.58	0.47	1.62	0.28	0.19	--	--	--
2	1.58	0.39	1.80	0.29	0.16	--	--	--
3	2.10	0.47	2.21	0.21	0.16	--	--	--
4	2.07	0.39	1.95	0.25	0.16	--	--	--
5	4.31	1.19	3.45	0.15	0.17	13.09	0.06	0.08
6	4.32	0.53	3.43	0.22	0.20	13.09	0.08	0.09
7	4.93	1.11	3.85	0.17	0.23	12.48	0.10	0.10
8	4.98	0.52	3.44	0.19	0.19	12.45	0.08	0.08
9	6.53	0.87	4.17	0.12	0.19	10.80	0.08	0.16
10	6.52	1.38	4.03	0.12	0.18	10.80	0.08	0.16
11	7.80	1.74	--	0.09	--	9.33	0.11	0.31
12	7.80	--	--	0.05	--	9.34	0.06	0.20

- Airblast Penetration 1982 -

Shot 65

09-SEP-82 08:23:18

Sage no.	First Pulse				Second Pulse			
	arriv. time, Ta (msec)	inter. time, T0 (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	1.51	0.35	1.99	0.34	0.20	--	--	--
2	1.49	0.45	1.87	0.32	0.17	--	--	--
3	1.98	0.55	1.58	0.22	0.16	--	--	--
4	1.96	0.47	1.56	0.25	0.17	--	--	--
5	3.74	0.58	0.80	0.04	0.02	--	0.04	0.04
6	4.17	0.25	0.91	0.07	0.02	--	0.04	0.05
7	4.75	0.30	--	0.05	--	--	0.03	0.05
8	3.55	0.29	0.75	0.09	0.03	--	0.06	0.06
9	4.02	0.43	0.88	0.06	0.02	--	0.03	0.04
10	4.63	0.17	0.95	0.06	0.02	--	0.09	0.05
11	5.22	0.38	--	0.02	--	--	0.03	0.05
12	5.13	0.45	--	0.04	--	--	0.07	0.06
13	5.04	0.42	--	0.04	--	--	0.06	0.05
14	5.12	0.47	--	0.04	--	--	0.06	0.05
15	3.74	0.37	0.78	0.07	0.02	--	0.04	0.06
16	4.18	0.35	0.73	0.05	0.02	--	0.03	0.04
17	4.76	0.32	--	0.05	--	--	0.04	0.05
18	4.58	0.42	1.02	0.04	0.01	--	0.02	0.05
19	4.22	0.82	--	0.02	--	--	0.02	0.05
20	6.05	0.39	--	0.03	--	--	0.03	0.06
21	5.96	0.64	--	0.03	--	--	0.02	0.06



- Airblast Penetration 1982 -

Shot 65

09-SEP-82 08:23:33

gage no.	First Pulse				Second Pulse			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
22	7.36	0.24	--	0.02	--	--	0.02	0.07
23	7.25	0.45	--	0.03	--	--	0.03	0.07

- Airblast Penetration 1982 -

Shot 66

09-SEP-82 08:23:44

gauge no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Td (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	1.20	0.48	1.30	0.32	0.15	--	--	--
2	1.18	0.36	1.54	0.33	0.13	--	--	--
3	1.68	0.64	1.48	0.22	0.13	--	--	--
4	1.66	0.56	1.40	0.23	0.13	--	--	--
5	3.40	0.47	0.78	0.03	0.01	--	0.03	0.03
6	3.85	0.44	0.76	0.05	0.02	--	0.03	0.03
7	4.44	0.27	--	0.05	--	--	0.06	0.03
8	3.24	0.31	0.72	0.09	0.03	--	0.03	0.05
9	3.71	0.41	0.79	0.05	0.02	--	0.03	0.03
10	4.32	0.21	0.78	0.06	0.01	--	0.07	0.04
11	4.90	0.50	--	0.01	--	--	0.02	0.03
12	4.81	0.39	--	0.04	--	--	0.06	0.04
13	4.70	0.40	--	0.04	--	--	0.05	0.04
14	4.90	0.40	--	0.04	--	--	0.05	0.04
15	3.42	0.37	0.76	0.05	0.02	--	0.05	0.03
16	3.85	0.35	0.73	0.05	0.01	--	0.02	0.02
17	4.43	0.24	--	0.05	--	--	0.03	0.04
18	4.27	0.38	0.93	0.04	0.01	--	0.02	0.03
19	3.90	0.76	--	0.01	--	--	0.02	0.04
20	5.72	0.37	--	0.02	--	--	0.02	0.04
21	5.62	--	--	0.01	--	--	0.03	0.04

- Airblast Penetration 1982 -

Shot 66

09-SEP-82 08:23:59

page no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa) msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa) msec)
22	6.93	0.44	--	0.02	--	--	0.02	0.05
23	6.90	--	--	0.01	--	--	0.02	0.05

- Airblast Penetration 1982 -

Shot 67

09-SEP-82 07:52:22

stage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Td (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa) msec	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa) msec
1	1.10	0.42	1.24	0.45	0.22	--	--	--
2	1.09	0.34	1.63	0.48	0.21	--	--	--
3	1.50	0.70	1.52	0.29	0.19	--	--	--
4	1.49	0.43	1.43	0.40	0.21	--	--	--
5	3.09	0.45	0.74	0.06	0.02	--	0.04	0.06
6	3.49	0.29	0.81	0.09	0.03	--	0.05	0.06
7	4.03	0.25	--	0.07	--	--	0.04	0.06
8	2.93	0.37	0.71	0.11	0.03	--	0.03	0.03
9	3.35	0.33	0.79	0.08	0.03	--	0.06	0.04
10	3.93	0.27	0.97	0.09	0.02	0.10	0.10	0.07
11	4.48	0.42	--	0.02	--	--	0.04	0.05
12	4.39	0.32	--	0.06	--	--	0.09	0.03
13	4.27	0.36	--	0.07	--	--	0.08	0.07
14	4.38	0.44	--	0.06	--	--	0.08	0.07
15	3.12	0.35	0.69	0.10	0.03	--	0.05	0.06
16	3.48	0.32	0.68	0.09	0.02	--	0.05	0.04
17	4.04	0.23	--	0.07	--	--	0.05	0.06
18	3.89	0.32	1.02	0.07	0.02	--	0.03	0.06
19	3.56	0.74	--	0.02	--	--	0.03	0.06
20	5.29	0.29	--	0.04	--	--	0.03	0.03
21	5.22	0.51	--	0.02	--	--	0.04	0.03

- Airblast Penetration 1982 -

Shot 67

09-SEP-82 07:52:36

page no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa) msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa) msec)
22	6.38	0.72	--	0.03	--	--	0.03	0.09
23	6.47	--	--	0.01	--	--	0.04	0.08

- Airblast Penetration 1982 -

Shot 68

09-SEP-82 07:52:47

gage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, T <sub>a</sub> (msec)	inter. time, T <sub>o</sub> (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa) msec	arriv. time, T <sub>a</sub> (msec)	Pmax (MPa)	Imax (MPa) msec
1	0.76	0.25	1.42	0.92	0.32	-	-	-
2	0.73	0.23	1.72	0.94	0.32	-	-	-
3	1.08	0.57	1.47	0.50	0.28	-	-	-
4	1.03	0.33	1.47	0.54	0.29	-	-	-
5	2.49	0.33	0.67	0.11	0.03	-	0.06	0.11
6	2.80	0.25	0.74	0.17	0.04	-	0.11	0.10
7	3.23	0.32	-	0.11	-	-	0.07	0.11
8	2.32	0.33	0.62	0.19	0.05	-	0.13	0.17
9	2.67	0.38	0.68	0.14	0.04	-	0.08	0.10
10	3.18	0.30	0.78	0.13	0.04	-	0.15	0.12
11	3.70	0.50	-	0.03	-	-	0.05	0.09
12	3.69	0.27	-	0.10	-	-	0.15	0.12
13	3.47	0.43	-	0.10	-	-	0.12	0.14
14	3.56	0.42	-	0.10	-	-	0.15	0.11
15	2.45	0.25	0.60	0.17	0.04	-	0.09	0.13
16	2.76	0.28	0.88	0.14	0.04	-	0.04	0.10
17	3.25	0.31	-	0.10	-	-	0.06	0.11
18	3.12	0.38	0.98	0.10	0.03	-	0.04	0.11
19	2.84	0.88	-	0.03	-	-	0.03	0.11
20	4.45	0.37	-	0.05	-	-	0.04	0.14
21	4.43	0.46	-	0.03	-	-	0.04	0.15

- Airblast Penetration 1982 -

Shot 68

09-SEP-82 07:53:03

gauge no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
22	5.59	0.47	--	0.04	--	--	0.04	0.17
23	5.65	0.48	--	0.05	--	--	0.04	0.16

- Airblast Penetration 1982 -

Shot 69

09-SEP-82 07:53:14

gauge no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Td (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa) (msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa) (msec)
1	0.50	0.20	2.23	1.75	0.58	--	--	--
2	0.50	0.26	1.93	1.43	0.53	--	--	--
3	0.72	0.21	1.48	1.05	0.46	--	--	--
4	0.72	0.40	1.54	1.10	0.48	--	--	--
5	1.88	0.29	0.73	0.20	0.05	--	0.11	0.33
6	2.10	0.25	0.80	0.28	0.07	--	0.11	0.37
7	2.50	0.28	--	0.21	--	--	0.12	0.34
8	1.70	0.26	0.62	0.38	0.09	0.26	0.25	0.44
9	1.97	0.33	0.73	0.27	0.07	--	0.17	0.34
10	2.38	0.26	0.90	0.23	0.06	--	0.23	0.40
11	2.88	0.22	--	0.17	--	--	0.24	0.39
12	2.76	0.31	--	0.20	--	--	0.29	0.45
13	2.65	0.47	--	0.19	--	--	0.21	0.50
14	2.74	0.42	--	0.19	--	--	0.33	0.41
15	1.89	0.23	0.52	0.37	0.07	--	0.19	0.38
16	2.10	0.22	0.68	0.30	0.06	--	0.08	0.33
17	2.50	0.33	--	0.19	--	--	0.13	0.38
18	2.40	0.30	0.88	0.20	0.05	--	0.11	0.34
19	2.21	0.59	--	0.06	--	--	0.06	0.33
20	3.59	0.44	--	0.08	--	--	0.07	0.39
21	3.62	0.38	--	0.05	--	--	0.10	0.39



- Airblast Penetration 1982 -

Shot 69

09-SEP-82 07:53:28

Sage no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
22	4.63	0.39	--	0.06	--	--	0.10	0.43
23	4.67	0.37	--	0.08	--	--	0.07	0.41

- Airblast Penetration 1982 -

Shot 70

09-SEP-82 07:53:39

gauge no.	First Pulse				Second Pulse			
	arriv. time, To (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa) msec)	arriv. time, To (msec)	Pmax (MPa)	Imax (MPa) msec)
1	0.40	0.30	1.98	2.12	0.84	--	--	--
2	0.40	0.22	1.91	2.63	0.80	--	--	--
3	0.60	0.30	1.59	1.69	0.71	--	--	--
4	0.57	0.27	1.51	1.66	0.72	--	--	--
5	1.59	0.25	0.58	0.33	0.07	--	0.14	0.64
6	1.76	0.18	0.74	0.57	0.10	--	0.28	0.78
7	2.11	0.30	--	0.34	--	--	0.15	0.79
8	1.42	0.23	0.55	0.63	0.12	--	0.35	0.90
9	1.64	0.26	0.66	0.49	0.10	--	0.40	0.66
10	2.01	0.27	0.97	0.38	0.09	--	0.48	0.90
11	2.43	0.17	--	0.23	--	--	0.43	0.74
12	2.31	0.40	--	0.30	--	--	0.48	0.88
13	2.22	0.41	--	0.32	--	--	0.24	0.79
14	2.30	0.37	--	0.30	--	--	0.49	0.90
15	1.57	0.26	0.59	0.51	0.11	--	0.21	0.75
16	1.72	0.23	0.70	0.46	0.10	--	0.18	0.68
17	2.09	0.31	--	0.28	--	--	0.17	0.75
18	2.00	0.35	0.82	0.26	0.07	--	0.17	0.69
19	1.83	0.58	--	0.09	--	--	0.11	0.67
20	3.07	0.43	--	0.11	--	--	0.10	0.71
21	3.15	0.57	1.13	0.13	--	--	0.12	0.71

- Airblast Penetration 1982 -

Shot 70

09-SEP-82 07:53:53

page no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
22	4.05	0.91	1.96	0.10	0.08	--	0.13	0.78
23	4.06	0.49	1.89	0.11	0.07	--	0.13	0.74

- Airblast Penetration 1982 -

Shot 71

09-SEP-82 08:24:16

gauge no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	Imax (MPa- msec)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa- msec)
1	0.42	0.23	1.76	2.00	0.58	--	--	--
2	0.41	0.20	1.75	2.00	0.56	--	--	--
3	0.65	0.39	1.37	0.95	0.42	--	--	--
4	0.62	0.34	1.38	1.25	0.48	--	--	--
5	1.78	0.30	0.62	0.21	0.05	--	--	0.33
6	2.00	0.23	0.75	0.32	0.07	--	0.12	0.36
7	2.40	0.30	--	0.21	--	--	0.12	0.35
8	1.61	0.22	0.59	0.42	0.09	--	0.20	0.43
9	1.99	0.35	0.65	0.29	0.07	--	0.17	0.32
10	2.30	0.30	0.87	0.23	0.06	--	0.25	0.39
11	2.75	0.25	--	0.17	--	--	0.26	0.41
12	2.64	0.38	--	0.19	--	--	0.29	0.43
13	2.56	0.44	--	0.21	--	--	0.22	0.50
14	2.64	0.38	--	0.19	--	--	0.27	0.38
15	1.76	0.25	0.64	0.33	0.08	--	0.21	0.34
16	1.97	0.28	0.73	0.27	0.06	--	0.10	0.31
17	2.40	0.42	--	0.18	--	--	0.12	0.34
18	2.30	0.38	0.82	0.18	0.05	--	0.10	0.33
19	2.08	0.64	--	0.06	--	--	0.07	0.32
20	3.48	0.47	--	0.08	--	--	0.08	0.37
21	3.51	0.57	1.19	0.10	0.05	--	0.06	0.37

- Airblast Penetration 1982 -

Shot 71

09-SEP-82 08:24:30

gauge no.	-----First Pulse-----				-----Second Pulse-----			
	arriv. time, Ta (msec)	inter. time, Too (msec)	pos. dur. (msec)	Pmax (MPa)	arriv. time, Ta (msec)	Pmax (MPa)	Imax (MPa)	Imax (MPa)
22-	4.51	0.75	1.39	0.07	0.05	0.10	0.41	
23	4.55	0.46	1.65	0.08	0.05	0.08	0.39	